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Contributors who wish their articles to appear in the next number are requested to forward them before the 10th of July to the Editor,

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The following works have been received for review :

Surgical Diseases of the Kidney. By HENRY MORRIS, M.A., M.B., F.R.C.S., Surgeon to, and Lecturer on Surgery at, Middlesex Hospital, London. Philadelphia : Lea Brothers & Co., 1886.

The Surgical Diseases of Children. By EDMUND OWEN, M.B., F.R.C.S., Surgeon to the Hospital for Sick Children, Great Ormond Street. Philadelphia : Lea Brothers & Co., 1886.

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A System of Practical Medicine. By American Authors. Edited by WILLIAM PEPPER, M.D., LL.D., Provost and Professor of the Theory and Practice of Medicine and of Clinical Medicine in the University of Pennsylvania. Assisted by LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania. Vol. IV. Diseases of the Genito-urinary and Cutaneous Systems, Medical Ophthalmology, and Otology. Philadelphia : Lea Brothers & Co., 1886.

Diseases of the Digestive Organs in Infancy and Childhood, with Chapters on the Investigation of Disease, and on the General Management of Children. By LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania. Philadelphia : P. Blakiston, Son & Co., 1886.

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On Dermatitis Ferox. By J. L. MILTON, Senior Surgeon to St. John's Hospital for Diseases of the Skin. Edinburgh.

Ovarian Abscess and Pyosalpinx. Pelvic Abscess. By FRANCIS IMLACH, M.D., Honorary Surgeon to the Liverpool Hospital for Women. Edinburgh, 1886.

On the Commoner Accidents Attending Parturition; their Immediate and Remote Effects. With Treatment. By WILLIAM A. DUNCAN, M.D., M.R.C.P., F.R.C.S., Assistant Obstetric Physician to, and Lecturer on Operative Midwifery at, the Middlesex Hospital. London, 1886.

On Extirpation of the Entire Uterus. By WILLIAM A. DUNCAN, M.D., M.R.C.P. London, 1886.

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Manuel Pratique des Maladies des Fosses Nasales et de la Cavité Naso-Pharyngienne. Par le DR. E. J. MOURE, Professeur libre des Maladies du Larynx, des Oreilles et du Nez, Directeur de la Revue Mensuelle de Laryngologie, Otologie et Rhinologie, etc. Paris, 1886.

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The Mechanism of Indirect Fractures of the Skull. By CHARLES W. DULLES, M.D., Fellow of the College of Physicians of Philadelphia.

Intubation of the Larynx, with History of Cases. By F. E. WAXHAM, M.D., Professor of Diseases of Children in the College of Physicians and Surgeons of Chicago, 1886.

The Evolution of Surgery. By DR. JOSEPH EASTMAN, Indianapolis.

Reflex Irritation from Hypertrophy of Labia Minora. By CHAS. L. GWYN, M.D., Galveston, Texas, 1886.

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The Production and Prevention of Perineal Lacerations during Labor. By HENRY T. BYFORD, M.D., Physician and Surgeon to the Woman's Hospital, Chicago. Chicago, 1886.

Ethics of Female Sterility. By A. REEVES JACKSON, A.M., M.D., Professor of Gynecology in the College of Physicians and Surgeons of Chicago.

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Water Supply of Cities and Villages. By A. VANDERVEER, A.M., M.D. Albany, 1886.

Esthetics of Medicine. By H. A. COTTELL, M.D., Professor of Medical Chemistry and Microscopy in the University of Louisville, Ky. 1886.

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General Atrophy of the Conducting Apparatus of the Ear (Proliferous Inflammation). By S. O. RICEY, M.D., Washington, D. C.

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The Nervous Symptoms of so-called Lithamia. By LANDON CARTER GRAY, M.D., Professor of Nervous and Mental Diseases in the New York Polyclinic. Brooklyn, 1886.

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Two Rare Cases of Abdominal Injury. By J. A. STUCKY, M.D., Lexington, Ky. New York, 1885.

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Report of the Cincinnati Hospital, 1885. Cincinnati, 1886.

Report of the Germantown Dispensary and Hospital. Philadelphia, 1886.

CORRIGENDUM.

DR. FRANK DONALDSON, JR., learns with regret that in his paper on "The Function of the Recurrent Laryngeal Nerve," in this number, he has unintentionally done injustice to Dr. Hooper. He is informed that the quotation from Dr. Hooper on page 94, "all our attempts to verify the observations have failed," does not refer to *all* the experiments made by Dr. Hooper, as he had supposed, but only to the last series.

CONTENTS.

ORIGINAL COMMUNICATIONS.

PAGE

On Ulcerative Endocarditis. By BYROM BRAMWELL, M.D., F.R.C.P. (Edin.), Assistant Physician and late Pathologist to the Edinburgh Royal Infirmary; Lecturer on the Principles and Practice of Medicine and on Practical Medicine and Medical Diagnosis, in the Extra-Academical School of Medicine, Edinburgh; formerly Physician to the Newcastle-on-Tyne Infirmary, etc. With a Report of Cultivation and Inoculation Experiments. By MR. A. W. HARE, Assistant to the Professor of Surgery in the University of Edinburgh.	17
Scarlatinal Nephritis. By I. E. ATKINSON, M.D., Professor of Therapeutics and Materia Medica and Clinical Medicine in the University of Maryland	53
Bacteriology. By W. WATSON CHEYNE, M.B., F.R.C.S., Assistant Surgeon to King's College, Hospital, Surgeon to the Paddington Green Children's Hospital, etc.	66
The Function of the Recurrent Laryngeal Nerve. From Experimental Studies in the Biological Laboratory of the Johns Hopkins University. By F. DONALDSON, JR., B.A., M.D., Chief of Clinic for Throat and Chest, University of Maryland, and late Scholar in Biology, Johns Hopkins University	93
Notes Toward the Formation of Clinical Groups of Tumors. By JONATHAN HUTCHINSON, F.R.S., LL.D., Emeritus Professor of Surgery to the London Hospital	103
Chronic Hyperplasia of the Oral Mucosa, with Cornification of its Epithelium. By P. F. HARVEY, M.D., Captain and Assistant Surgeon, U. S. A.	110
The Functions of the Membrana Tympani Illustrated by Disease. By SIR WILLIAM B. DALBY F.R.C.S., Aural Surgeon to St. George's Hospital, London	121
Micrococcus Pasteuri. By GEORGE M. STERNBERG, M.D., Major and Surgeon, U. S. A.	123
A Case of Traumatic Neuritis of Thirty-five Years' Duration. Treatment by Repeated Nerve-section; Subsequent History and Autopsy. By R. OSGOOD MASON, M.D., of New York	131

	PAGE
The Surgery of the Pancreas, as Based Upon Experiments and Clinical Researches. By N. SENN, M.D., Attending Surgeon to the Milwaukee Hospital; Professor of the Principles and Practice of Surgery and Clinical Surgery in the College of Physicians and Surgeons, Chicago, Illinois	141
Elephantiasis Arabum of the Labia Majora. A Case of Successful Operation by Excision. By HENRY I. RAYMOND, A.M., M.D., Assistant Surgeon U. S. A.	166

REVIEWS.

Recent Brain Surgery.

1. Transactions of the American Surgical Association. Volume III. Edited by J. EWING MEARS, M.D.
2. The Field and Limitation of the Operative Surgery of the Human Brain. By JOHN B. ROBERTS, A.M., M.D., Prof. of Anatomy and Surgery in Philadelphia Polyclinic.
3. Case of Cerebral Tumor. By A. HUGHES BENNETT, M.D., F.R.C.P. The Surgical Treatment, by RICKMAN J. GODLEE, M.S., F.R.C.S. From Vol. LXVIII. of the *Medico-Chirurgical Transactions*. 169

Recent Works on Diseases of the Larynx and Respiratory Passages.

1. The Therapeutics of the Respiratory Passages. By PROSSER JAMES, M.D., Lecturer on Materia Medica at the London Hospital Medical College, etc.
2. Laryngoscopy and Rhinoscopy. By PROSSER JAMES, M.D.
3. Diseases of the Larynx. By DR. J. GOTTSTEIN, Lecturer at the University of Breslau. Translated and added to by P. McBRIDE, M.D., of Edinburgh 173

A Handbook on the Diseases of the Nervous System. By JAMES ROSS, M.D., F.R.C.P., LL.D., Senior Assistant Physician to the Manchester Royal Infirmary, etc. 180

The Management of Labor and of the Lying-in Period. A Guide for the Young Practitioner. By HENRY G. LANDIS, A.M., M.D., Professor of Obstetrics and Diseases of Women in Starling Medical College, etc. . 183

The Surgical Diseases of Children. By EDMUND OWEN, M.B., F.R.C.S., Surgeon to the Hospital for Sick Children, Great Ormond St., London 185

How to Drain a House. Practical Information for Householders. By GEORGE E. WARING, JR., M. Inst. C. E., Consulting Engineer for Sanitary Drainage. 188

The Pathology and Etiology of Congenital Club-foot. By ROBERT WILLIAM PARKER, Surgeon to the East London Hospital for Children; and SAMUEL GEORGE SHATTOCK, Curator of the Museum, St. Thomas's Hospital 191

Moisture and Dryness; or the Analysis of Atmospheric Humidities in the United States. An Essay read before the American Climatological Association in 1884. By CHARLES DENISON, A.M., M.D., Professor of Diseases of the Chest and of Climatology, University of Denver, etc. .	192
A Manual of Human Physiology, including Histology and Microscopical Anatomy, with Special Reference to the Requirements of Practical Medicine. By DR. L. LANDOIS, Professor of Physiology and Director of the Physiological Institute, University of Griefswald. Translated from the Fourth German Edition, with Additions, by WILLIAM STIRLING, M.D., S.D., Regius Professor of the Institutes of Medicine or Physiology in the University of Aberdeen	194
Manual of the Diseases of Women, being a Concise and Systematic Exposition of the Theory and Practice of Gynecology; for the Use of Students and Practitioners. By CHARLES H. MAY, M.D., late House Physician to Mount Sinai Hospital, New York, etc.	195
De la Suture des Nerfs à Distance. Par le DR. GEORGE ASSAKY, Préparateur de Médecine Opératoire à la Faculté, etc.	
The Suture of Nerves after Loss of Substance. By DR. GEORGE ASSAKY, etc.	196
The Principles and Practice of Surgery. By FRANK HASTINGS HAMILTON, A.M., M.D., LL.D.	197
Von Ziemssen's Handbook of General Therapeutics. Vol. IV. The Treatment of Disease by Climate, by DR. HERMANN WEBER; translated by HEINRICH POST, M.D., M.R.C.P. Lond., Physician to the German Hospital, London, etc; and General Balneotherapeutics, by PROFESSOR OTTO LEICHTENSTERN; translated by JOHN MACPHERSON, M.D., Inspector-General of Hospitals (retired)	199
The Landmarks of Snake Poison Literature, being a Review of the More Important Researches into the Nature of Snake Poisons. By VINCENT RICHARDS, F.R.C.S. Ed., etc., Civil Medical Officer of Goalundo, Bengal; late member of the Indian Snake Poison Commission	201
Health Reports.	
1. Seventh Annual Report of the State Board of Health of Illinois, with an Appendix Containing the Sanitary Publications of the Board during 1884.	
2. Proceedings and Addresses at the Sanitary Convention held at Ypsilanti, Michigan, June 30 and July 1, 1885.	
3. Ninth Report of the State Board of Health of Wisconsin for 1885 .	202
Manuel Pratique des Maladies des Fosses Nasales et de la Cavité Nasopharyngienne. Par le DR. E. J. MOURE, Professeur libre des Maladies du Larynx, des Oreilles et du Nez; Directeur de la Revue Mensuelle de Laryngologie, Otologie et Rhinologie, etc.	203

Clinical Studies on Diseases of the Eye, including those of the Conjunctiva, Cornea, Sclerotic, Iris, and Ciliary Body. By DR. FERDINAND RITTER VON ARLT, Professor of Ophthalmology in Vienna. Translated by LYMAN WARE, M.D., of Chicago	204
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QUARTERLY SUMMARY

OF THE

PROGRESS OF MEDICAL SCIENCE.

ANATOMY.

Under the charge of GEORGE D. THANE, M.R.C.S. ENG.,

Professor of Anatomy at University College, London.

The Lumbar Curve of the Spine in Several Races of Men. By Sir William Turner	205
On the Morphology of the Tarsus. By G. Baur	205
On the Condition of the Umbilical Vein after Birth, and its Anastomoses with the Veins of the Abdominal Wall. By E. Wertheimer	206
On the Rudiment of a Septal Gland in the Human Nose. By C. Gegenbaur	206
On the Relation between the Calibre of the Bronchi and the Volume of the Lungs. By W. H. Browne and H. Stahel	207
On Some Points in the Anatomy of the Thyroid Gland. By A. Strecker	208
On the Constitution of the Lateral Column of the Spinal Cord, and on the Origin of the Ascending Root of the Fifth Nerve. By Prof. W. Bechterew	209

PHYSIOLOGY.

Under the charge of GERALD F. YEO, M.D.,

Professor of Physiology at King's College, London.

Function of the Posterior Cerebral Commissure. By Darkschewitsch	210
Irritability of the Spinal Cord. By M. Schiff	210
Visceral and Vasomotor Nerves. By Dr. W. H. Gaskell	211
Development of the Sympathetic Nerve. By Onodi	214

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

Under the charge of ROBERTS BARTHOLOW, M.D., LL.D.,

Professor of Materia Medica, General Therapeutics, and Hygiene in Jefferson Medical College, Philadelphia.

	PAGE
The Bark of Quebracho Blanco and its Active Principles. By MM. Charles Éloy and Henri Huchard	214
Calomel in the Treatment of Hypertrophic Cirrhosis and other Affec- tions. By Sacharjin	218
Urethan: its Physiological Actions, and Antagonism to Strychnine. By Prof. Coze	219
Terpene in Chronic Bronchitis. By Dr. Rieu	220
Action of Amyl Nitrite. By L. Schweinburg	220
Physiological and Clinical Action of Grindelia Robusta. By Dr. Vasili Dobrokolowski	220
Results of Administration of Thallin, and Caution as to its Physiological Effects. By Dr. Karst	221

SURGERY.

(IN EUROPE.)

Under the charge of FREDERICK TREVES, F.R.C.S.,

Surgeon to, and Lecturer on Anatomy at, the London Hospital.

Recent Surgical Literature	222
The Fate of Pathogenous Germs in the Body. By Dr. Ribbert	227
Nerve Suturing. By Mr. Reginald Harrison, Dr. Koppeschaar, and Hoffmann	227
Surgical Treatment of Empyema. By Dr. Maclaren	227
Compression of the Innominate Artery. By Prof. Annandale	228
On Rectal Exploration in Cases of Hip Disease. By Dr. Schmitz	228
On the Treatment of Hip Dislocations Complicated by Fracture of the Neck of the Femur. By Dr. Wippermann	229
Acute Myositis. By Prof. Scriba	229
Aneurism of the Abdominal Aorta. By Dr. Liebrecht	229
A New Method of Reducing Hernia. By Dr. Nikolaus	230
Flat-foot. By Prof. Humphry	230
Drainage of the Bladder. By Mr. Howlett	231
On the Cause of Hypertrophy of the Prostate. By Mr. Reginald Harrison	231
Tubercular Disease of the Genito-urinary Organs in the Male. By Dr. Steinthal	232
Operations on the Stomach. By Dr. Hacher	232
On the Treatment of Peritonitis by Laparotomy. By Prof. Studensky, Dr. Naumann, M. Chavasse, Dr. Valerani, and Dr. J. Mikulicz	233

(IN AMERICA.)

Under the charge of R. J. HALL, M.D.,
Of New York.

	PAGE
Tracheotomy for Pseudo-membranous Laryngitis. By Dr. Robert W. Lovett	234
Intubation of the Larynx in Fifteen Cases of Diphtheritic Croup. By Dr. Dillon Brown	235
Laparotomy in the Treatment of Penetrating Wounds and Visceral Injuries of the Abdomen. By Professor F. S. Dennis	235
Permanent Drainage in Ascites. By Dr. Aug. G. Caillé	236
On Spontaneous Phlebectasia of the Foot. By Dr. A. G. Gerster	237

OPHTHALMOLOGY.

Under the charge of CHARLES STEDMAN BULL, A.M., M.D.,

Lecturer on Ophthalmology in the Bellevue Hospital Medical College, Surgeon to the New York Eye and Ear Infirmary.

A New Operation for Congenital Ptosis and Paralytic Ptosis. By Panas	238
The Artificial Cornea. By Martin	239
Sympathetic Keratitis following Destruction of an Eye from Injury. By Rolland	239
A Case of Sympathetic Inflammation Cured without Enucleation of the Fellow Eye. By Hoffmann	240
The Etiology of Glaucoma. By Schœn	240
Partial Embolism of the Inferior Division of the Central Retinal Artery associated with repeated previous attacks of Chorea. By Benson	241
On Changes in the Fundus of the Eye in Sepsis. By Boyer	242
Epilepsy with Optic Neuritis, Cured by Enucleation of the Wounded Eye. By Galewski	242
Acute Rheumatic Retrobulbar Neuritis. By Perlia	243
The Insufficiency of the Power of Convergence. By Landolt	243
The more Modern Operations for Trichiasis. By Benson	244
Nerve-stretching—Badal's Operation. By Lagrange	245
Paralyses of the Motor Nerves of the Eye, and their Treatment by the Bromohydrate of Pelletière. By Galewski	246
Researches and Remarks upon Ocular Grafting or Transplantation. By Terrier	246
The Infecting Germs Contained in Lachrymal Sac Abscesses, and their Relation to Antiseptics. By Sattler	246
The Antiseptic Action of Cocaine, Corrosive Sublimate, and Chlorine Water upon the Secretions in Dacryocystitis, Tested by Inoculations of the Cornea. By Schmidt-Rimpler	247
Experiments on the Action of Bacteria in Operations on the Eye. By Knapp	248
Skiascopy; its Advantages and its Place in Ophthalmology. By Chibret	248

OTOLOGY.

Under the charge of CHARLES H. BURNETT, M.D.,

Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine, etc.

	PAGE
Membranous Closure of the External Auditory Canal. By Hermann Rothholtz	249
Foreign Bodies in the Air. By Hedinger	249
Morbid Changes in the Bone in the Auditory Canal of Ancient Peruvian Skulls. By R. Virchow	250
Fracture of the Handle of the Malleus by a Blow on the Ear. By Dr. A. Eitelberg	250
Abscess of the Brain Caused by Otorrhœa; Cured by an Operation. By Schede	251
The Relation of the Chorda Tympani to the Perception of Taste in the Anterior Two-thirds of the Tongue. By Dr. Edward Schulte	251
Rupture of both Membranæ Tympanorum, and Concussion of both Labyrinths. By Dr. Keeler	252
Exfoliation of a Necrotic Cochlea, Containing the two Upper Whorls; Healing of the Suppuration, with only Partial Loss of Hearing in the Affected Ear. By Dr. Joseph Gruber	253

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

Under the charge of J. SOLIS-COHEN, M.D.,

Professor of Diseases of the Throat and Chest, Philadelphia Polyclinic.

Tuberculous Ulceration of the Mouth. By Dr. E. Clifford Beale	253
Unusual Wound of the Soft Palate. By M. Pasteur	254
Cylindroma of the Soft Palate. By Sir W. Mac Cormac	254
Accessory Tonsil. By Jurasz	255
Acute Tonsillitis and Rheumatism. By Mr. Fox and Dr. Easby	255
Pemphigus of the Pharynx. By Dr. Charles E. Gooding	255
Cocaine to the Pharynx in Hydrophobia	255
Mycosis of the Throat. By Dr. Henri Guinier	255
Aneurism of the Left Internal Carotid Artery in its Extreme Upper Portion Rupturing into the Pharynx. By Prof. M. F. Coomes	255
Lateral Pharyngotomy for Extirpation of Malignant Tumors in the Tonsillar Region. By Prof. J. Mikulicz	256
Neuroses of the Pharynx. By Dr. Th. Herring	256
Stricture of the Œsophagus. By Dr. B. Ward Richardson and Sir Wm. Mac Cormac	257

	PAGE
Carcinoma of the Œsophagus. By Dr. T. S. K. Morton	257
A New Nasal Speculum. By Dr. L. Katz	257
Œsophagotomy. By Mr. Bennett May and Dr. T. M. Markoe	257
Epistaxis. By Dr. Lavrand	258
Coryza. By Rabow	258
Aluminium Acetico-tartaricum, and Aluminium Acetico-glycerinatum Siccum in Laryngitis, Pharyngitis, Chronic Rhinitis, and Ozaena. By Dr. Max Schæffer.	258
Nasal Polypi. By Mr. Spencer Watson	259
Hay Fever and Allied Affections. By Dr. Ziem and Prof. Bosworth	259
Nasal Reflexes. By Dr. Emil Gruening, Dr. Thos. A. McBride, Dr. Har- rison Allen, Dr. Abram Jacobi, and Theodore Hering	260
Adenoid Vegetations in the Nasopharyngeal Cavity. By Dr. Michael	260
Neoplasms of the Nasal Septum. By Dr. O. Chiari	261
Tuberculosis of the Larynx; Lactic Acid Treatment in the Larynx, Pharynx, and Nose, with Especial Reference to Tuberculosis of the Larynx. By Dr. Edmund Jelinek	261
Cornu Laryngeum. By Dr. A. Jurasz	262
Fracture of the Larynx. By Dr. Pérotti, Dr. Manby, and Dr. William Hunt	262
Eccchondroses and Exostoses of the Larynx. By M. Henry Bertoye	262
Carcinoma of the Larynx. By Dr. W. Lubinsky	263
Neuroses of the Larynx. By Dr. Treuvelot, Dr. Brebion, and Dr. Hering	264
Spasm of the Larynx in Hydrophobic Tetanus. By Dr. Conrad Brunner	264
Paralysis of the Larynx. By Dr. A. Cartaz	265
Stricture of the Trachea. By Dr. J. Dreschfeld, Dr. Gougenheim, and A. Robin	265

DERMATOLOGY.

Under the charge of LOUIS A. DUHRING, M.D.,

Professor of Dermatology in the University of Pennsylvania,

AND

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Physician to the Philadelphia Dispensary for Skin Diseases.

Therapeutic Use of Lanolin. By Lassar	266
Dermatitis Ferox. By J. L. Milton	267
Etiology of Alopecia Areata. By Max Joseph	268
Resorcin in Acuminated Warts. By Cæsar Bæck	268
Leucoderma Syphiliticum. By O. Rosenthal	268
Rhinoscleroma. By Prof. Köbner, Dr. Payne, Dr. Semon, and Janovsky	269
Papayotin in Glosso-pathology. By Schwimmer	270
Delhi Boil. By J. Hickman	271
Hereditary Predisposition to Bleb-formation. By Max Joseph	272
The Treatment of Eczema and Impetigo in Children by the Internal Use of Chrysarobin. By Stocquart	272

MIDWIFERY.

Under the charge of FRANCIS H. CHAMPNEYS, M.B., F.R.C.P.,
Obstetric Physician to St. George's Hospital.

	PAGE
On the Lower Segment of the Uterus. By Hofmeier	273
Parturition during Hypnotism. By Pritzl	274
On the Form of the Uterine Muscle-curve and on Peristalsis of the Human Uterus. By Schatz	275
Quinine as an Oxytocic. By J. A. Coe and J. E. Allen	275
On the Possibility of Perceiving the Cardiac Impulse of the Intrauterine Fœtus when the Latter is Extended. By Fischel	276
Some Recent Considerations on the Prefœtal Dilatation of the Vulva, accompanied by a Study on the Formation and Rupture of the Sac of the Liquor Amnii. By Dr. Léon Dumas	276
Dropsy and Albuminuria in Pregnancy. By Leyden	282
The Advisability of Inducing Abortion in Cases of so-called Uncontrollable Vomiting of Pregnancy. By Dr. O. W. Roe	282
Extrauterine Gestation; Death from Rupture	283
A Case of Extrauterine Pregnancy. By Dr. G. R. Robertson	284
On the Value of Braxton Hicks's Method of Combined Version in Cases of Induced Premature Labor. By Fehling	285
Splitting of the whole Urethra during Labor. By Krukenberg	285
Rupture of the Uterus	286
A Case of Cæsarean Section, with Remarks on the Use of Silver Sutures. By Schauta	286
Unsuccessful Case of Cæsarean Section after the Method of Säger and Leopold. By Münster	288
Porro's Operation; Survival of Mother and Child	288
When Should the Umbilical Cord be Tied?	289
The Etiology of Ischuria during the Post-partum Period, and after the Removal or Tapping of Large Abdominal Tumors, with some Remarks on Micturition in General. By Schwarz	289
The Temperature of the Mammary Gland during the Puerperium. By Negri	291
The Prophylaxis of Pendulous Abdomen in Women. By Czerny	292
The Medico-legal Importance of Hæmatoma of the Sterno-mastoid in Newborn Children. By Küstner	292

GYNECOLOGY.

Shock, its Relation to Diseases of the Organs of Circulation in Abdominal Tumors. By Hofmeier	293
Diabetes in Relation to the Uterine Life, Menstruation, and Pregnancy. By Dr. Lécorché	295

	PAGE
The Significance and Diagnosis of Gonorrhœa in Women. By Lomer	297
On the Palpation of Pelvic Organs. By Schultze	298

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

Under the charge of MATTHEW HAY, M.D.,
Professor of Medical Jurisprudence, University of Aberdeen.

Lung Test in Infanticide. By Sommer	300
State of the Pupil after Death. By Dr. J. N. Marshall	301
Different Putrefactive Appearances in the Corpses of Two Individuals who Died under exactly similar Circumstances. By Meyer	301
Sulphuretted Hydrogen. By Brouardel and Loye	302
Ptomaines. By Lehnert, Oeffinger, Salkowski, Lépine, Guérin, Hager, and Bocklisch	303
Poisoning by Cheese. By Vaughan	303
Alleged Homicide by Chloroform Poisoning	303
Alleged Poisoning by Colchicine. By Brouardel	304
The Results of Recent Investigations of Pork. By Dr. Herrmann Eulen- berg	304

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ON ULCERATIVE ENDOCARDITIS.

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WITH A REPORT OF CULTIVATION AND INOCULATION EXPERIMENTS.

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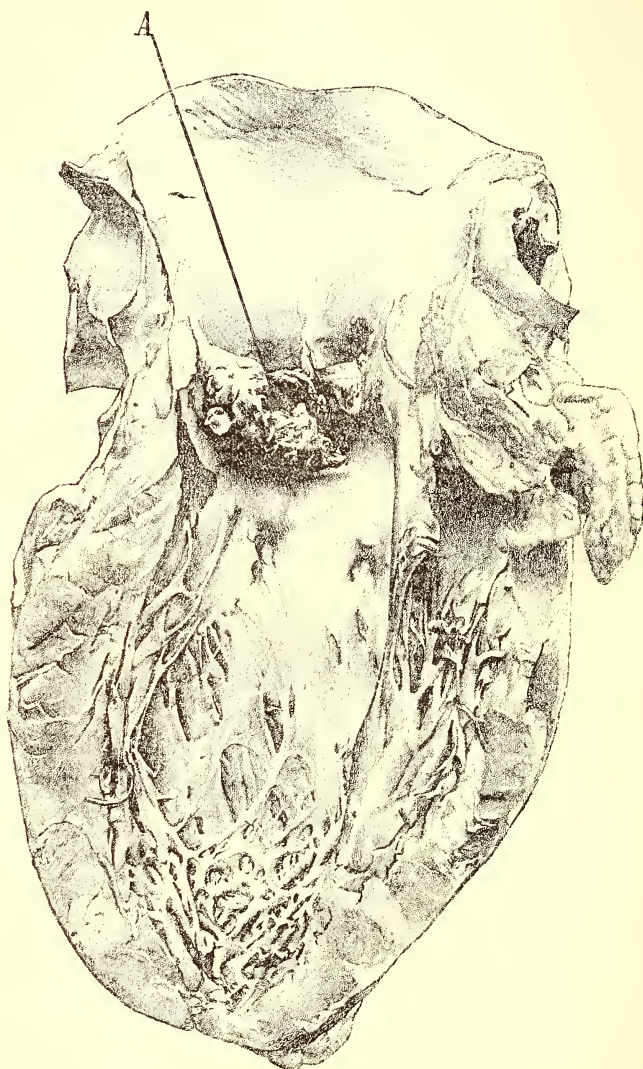
IN addition to the cases of simple endocarditis which were analyzed in my paper on right-sided endocarditis in the April number of this journal, there were 14 cases which seemed to belong to the ulcerative or malignant form of the disease. I am doubtful whether two of these should be included, for although the character of the vegetations, their luxuriance and the presence of micrococci, was suggestive of the malignant variety, the other pathological features—notably the condition of the spleen—seemed in favor of the simple form of the disease.

The frequency with which the different valves were affected was as follows: Aortic valve alone in 7 cases (in one of these there appeared to be the remains of old vegetations on the mitral valve); *aortic* and *mitral* in combination in 6 cases; *aortic* and *tricuspid* in combination in 1 case. The *aortic valve* was, therefore, affected either alone or in combination in 14 cases = 100 per cent.; the *mitral* in 6 cases = 42.85 per cent.; the *tricuspid* in 1 case = 7.14 per cent.

These results appear to be exceptional; for Osler, in his analysis of more than 200 cases, found that "the aortic and mitral valves were

affected together in 41 cases; the aortic alone in 53; the mitral alone in 77; the tricuspid in 19; the pulmonary valves in 15; and the heart-wall in 33."¹

FIG. 1.



Interior of the left ventricle, showing extensive ulcerative endocarditis of the anterior coronary segment in the case of A. Blythe.

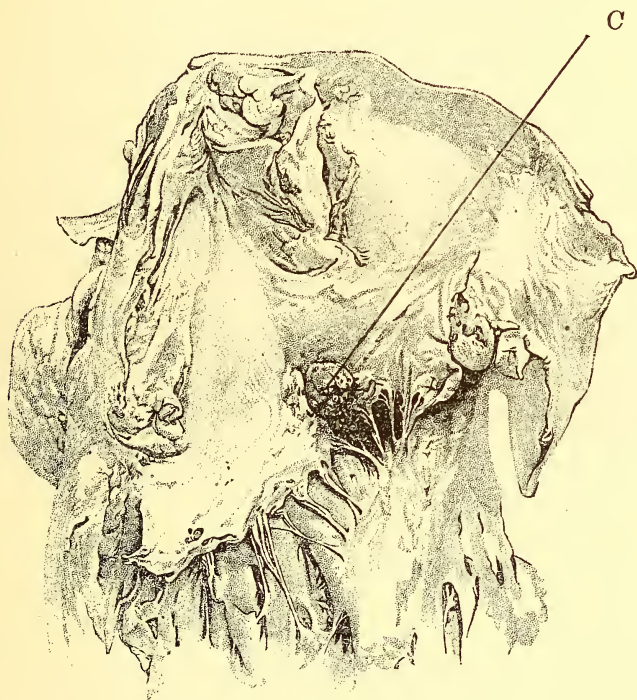
The letter A points to a large ragged perforation in the valve segment.

The aortic valve segments were *perforated* or *ulcerated through* in 8, and the mitral in 3 cases. Aneurisms were present on the mitral valve

¹ Gulstonian Lectures on Malignant Endocarditis, Lancet, March 7, 1885, p. 417.

in 1 case; on the aortic segments in several of the cases in which the valve segments were perforated; and at the root of the aorta (in or immediately above the sinuses of Valsalva) in 2 cases. In 1 case there was an aneurism of the left ulnar artery, which had ruptured into the tissues of the forearm, and formed a large false sac. *Rupture of the chordæ tendineæ* was met with in 1 case. *Vegetations* were present on the *endocardium* in several instances (though they are only noted in the ledger as having been present in 1 case); there were also vegetations at the

FIG. 2.



The interior of the right auricle, the tricuspid valve, and part of the interior of the right ventricle, in the case of A. Blythe, showing a small aneurism (C) which sprang from the bottom of the left coronary sinus of Valsalva, and projected into the cavity of the left auricle, at the level of the attachment of the tricuspid valve.

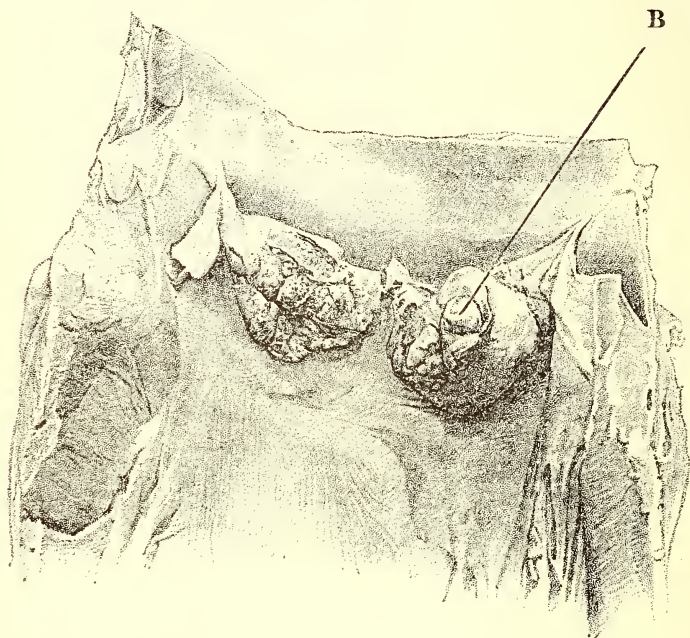
root of the aorta in 3 cases. In several instances, the vegetations at the root of the aorta, and perforation of the anterior flap of the mitral valve, were clearly due to the friction and impaction of long, pendulous vegetations attached to the aortic segments. *Chronic valvulitis* was certainly present in 7, and probably in at least one or two other cases.

The naked-eye appearances which the lesion presented were very various; some of them are shown in Figs. 1, 2, 3, 4, and 5.

In two cases the vegetations were of a greenish-yellow color, an appearance which Osler has also described.¹

The size of the heart is not noted in 1 case, in 2 it was normal, and in the remaining 11 cases the organ was enlarged, often to a very considerable degree.

FIG. 3.



The aortic valve in a case of ulcerative endocarditis, showing luxuriant flat vegetations on two of the segments.

The more important associated pathological changes were as follows :

(1) SPLEEN.—The condition of the spleen was noted in all but one case;² the organ was invariably enlarged. In one case its structure appeared normal to the naked eye; in two cases it was dark colored, firm, and congested, resembling the ordinary spleen of old-standing mitral disease; in one case it appeared to be waxy; in all the other instances it was soft, pulpy, and fever-like. In two cases ordinary hemorrhagic infarcts are stated to have been present in the spleen, but the number of cases in which this lesion occurred was probably greater, for I have a strong impression that the presence of infarcts has in more than one case been omitted by the clinical clerk in transcribing the notes.

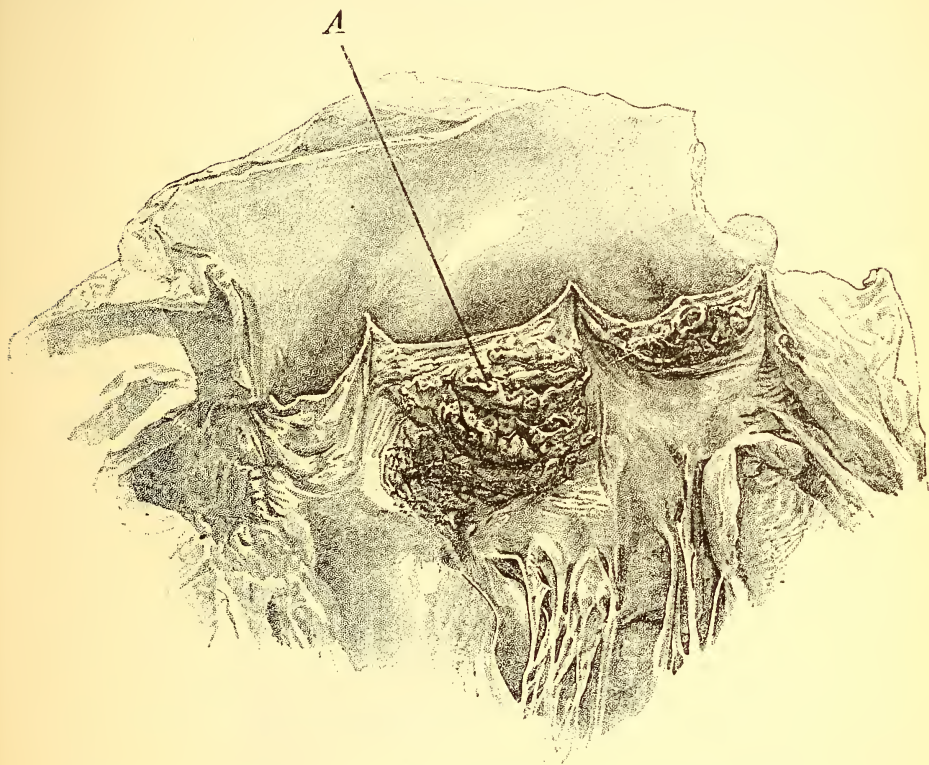
¹ Gulstonian Lectures on Malignant Endocarditis, MEDICAL NEWS, March 21, 1885, p. 310.

² In the case in which the spleen was not examined, "permission" was strictly limited to the cavity of the thorax.

In one case the spleen was in a state of commencing suppuration, innumerable small infective emboli being scattered throughout its substance.

(2) LUNGS.—Acute croupous pneumonia was certainly present in 3, and probably in 7 of the 14 cases; in 1 instance both lungs were

FIG. 4.



Aortic valve in a case of ulcerative endocarditis, showing heaped-up masses of moderately firm vegetations on the intercoronary and left coronary segments, both of which were perforated in their centres.

affected with well-marked gray hepatization; in 2 cases there was well-marked red hepatization, in 1 both lungs being affected, and in the other the left only involved; in 4 cases both lungs were affected with œdema and congestion, which seemed to be pneumonic.

In 3 cases œdema and congestion of a simple (non-pneumonic) kind were present; in 1 there was marked brown induration; in 1 marked emphysema; in 1 ordinary hemorrhagic infarcts and patches of pulmonary apoplexy; and in 1 case empyema with compression of the right lung, and recent pleurisy on the opposite side.

(3) KIDNEYS.—In 1 case the condition of the kidney was not ascertained; in 5 cases the weight was normal; in the remaining 8 cases the kidneys were enlarged, in some instances very markedly so. Ordinary hemorrhagic infarcts were present in 3 cases; in 1 instance both kidneys were studded with septic infarcts and miliary abscesses; in 1 case many small ecchymoses, indicative of minute microscopical infarctions, were scattered throughout the cortex. In 2 cases the usual appearances of acute (non-suppurative) nephritis were present.

FIG. 5.



Aortic valve in a case of ulcerative endocarditis, showing extensive ulceration and a large stalactite-looking vegetation (B) projecting from the left coronary cusp. Some small vegetations (A) are present at the base of the aorta, and on the wall of the ventricle, just below the aortic orifice.

(4) NERVE CENTRES.—In 8 cases the condition of the nerve centres was not ascertained. In 2 of the remaining 6 cases, there was well-marked cerebral meningitis; in 1 of these cases the left middle cerebral artery was plugged with a recent infarct; the Island of Reil was in a

state of commencing softening, and there were numerous small punctiform ecchymoses in the gray matter of each hemisphere; in the other case, the membranes of the spinal cord were also in a state of commencing inflammation. In a third case, basilar meningitis was just commencing; in a fourth, the membranes were adherent (the result of old disease) over the left ascending parietal and frontal convolutions.

In 4 of the 6 cases in which the nerve centres were examined there were small hemorrhages in the retina.

(5) SKIN AND CUTANEOUS CELLULAR TISSUE.—Punctiform ecchymoses and purpuric spots were noted as having been present in 3 cases, but I feel certain that they were more frequently observed. In 1 case, in which there was no croupous pneumonia, an herpetic eruption was present on the lips. In 6 cases the feet and legs were œdematous, and in 3 of these cases the œdema was great.

(6) LIVER, INTESTINE, UTERUS.—In no case were miliary abscesses or infarcts found in the liver; in several instances the organ presented the ordinary appearances due to chronic venous engorgement; in 1 case there had evidently been previous syphilitic hepatitis; and in 1 case there was hypertrophic cirrhosis.

In 3 instances at least (I think the number was greater) punctiform ecchymoses and small hemorrhages were present on the gastro-intestinal mucous membrane. In one case, the uterus was enlarged, the patient having been prematurely confined shortly before her admission to hospital. A rough, granular-looking mass, the remains apparently of a portion of placenta, projected into the uterine cavity; and there was an extravasation of blood about the size of a bean on the serous surface of the organ; notwithstanding these suggestive appearances, micrococci were not detected in the tissues of the uterus.

(7) THE PRESENCE OF MICROÖRGANISMS IN THE VEGETATIONS AND TISSUES.—In 3 instances the cardiac vegetations were not examined for microörganisms; in all the remaining 11 cases, microörganisms were found. In every instance, the organism was a micrococcus of small size which was either scattered through the substance and on the surface of the vegetation, or collected on the surface in round masses; in no case were encapsuled masses of micrococci observed; in 6 cases, the vegetations were literally teeming with micrococci.

METHOD OF STAINING.—Gram's method was in all instances employed, methyl-violet, prepared according to Ehrlich's method (as recommended by Dr. M. Afanassiew, in the *Edinburgh Medical Journal* for February, 1885), being, as a rule, substituted for gentian-violet.

In the examination of large sections of delicate and fragile tissue, such as the brain and spleen, the following modification of the usual method of carrying out Gram's process was employed, and will, I think, be found an improvement. It enables the section to be manipulated

with much greater freedom, and prevents the tearing and breaking of the tissue, which in my hands so frequently occur in the process of transferring a large and delicate section from the "lifter" and spreading it out on the slide preparatory to the final mounting. It also enables one to regulate with greater precision and accuracy, than is, I think, possible by the ordinary Gram's method, the washing out of the coloring matter from the tissues by the absolute alcohol and oil of cloves respectively; finally, it has yielded in my hands more permanent preparations than the ordinary method.

The process is as follows:

The section having been (1) stained with methyl-violet; (2) washed for a second or two in distilled water; (3) immersed for two or three minutes in a solution of iodine in iodide of potassium; and (4) again washed in distilled water, as in the ordinary Gram's method; is (5) placed in a watch-glass containing absolute alcohol until the greater part of the coloring matter is washed out, but the decolorization should not be carried so far as in the ordinary method; (6) the section is then placed for a minute or two in a solution of eosine, from which (7) it is transferred to a basin of distilled water, where it may remain without injury for two or three hours—a great convenience to the operator. (8) The section is then floated on to, and carefully spread out on, a glass slide, as in the ordinary method of mounting large microscopical sections of delicate tissue. (9) It is next treated, while on the slide, with successive doses of absolute alcohol, until it is completely dehydrated and sufficiently decolorized. In the case of very thin sections, which have been already pretty well decolorized, one or two doses of absolute alcohol dropped from a bottle on to the slide, and allowed to flow over the specimen, are usually sufficient. (10) The excess of alcohol is allowed to flow off the section, the slide being inclined to one side to facilitate drainage; the slide round the margins of the section is carefully dried with the finger or a piece of fine cambric; and (11) *while the section is still moist*, a small quantity of oil of cloves is dropped on to the slide at one side of the section; the slide is then inclined to the opposite side and the oil of cloves allowed to flow *under* the section, the preparation being supported in position by the point of a needle placed on the edge opposite to that from which the oil of cloves is flowing; the section may, of course, be *held* in position by the needle being placed through it at the side *from which* the oil of cloves is running, but this I find is more likely to produce tearing in the case of very delicate tissues, such as brain and spinal cord. When the preparation is *thoroughly cleared*—it must be perfectly transparent—the slide is still further inclined, and the oil of cloves carefully wiped away from the edge of the section. (12) One or two large drops of zylol balsam are then placed

on the section (the amount of balsam must, of course, be varied with the size of the section) and the cover-glass is placed in position.

A little practice will enable the operator to manipulate the section on the slide with great facility, and to determine the amount of absolute alcohol and oil of cloves which is required. Specimens which are properly prepared in this way retain their color; the micrococci in some of my sections, which were mounted a year ago, are still quite as brightly stained as when the preparations were first made. To insure permanency, each step in the process must be *thoroughly* carried out—the water in the section must be completely removed by the absolute alcohol—the alcohol must be thoroughly removed by the oil of cloves. If the section is not quite transparent after being treated with oil of cloves, it must be again treated with alcohol and again cleared—any excess of oil of cloves must be drained away by inclining the slide—and the amount of zylol balsam placed on the section must be more than is required for the mere mounting of the preparation, in order to drive out any oil of cloves which still remains in the section.

After mounting, the preparation should be placed aside on a flat surface, any balsam which exudes being absorbed by small pieces of blotting paper placed round the margins of the cover-glass. After a day or two a small weight may be placed on the cover-glass; but if this is done, care must be taken that the weight is not so heavy as to squeeze out or destroy the continuity of the sections. Heavier weights may from time to time be substituted; the excess of balsam is in this way gradually removed, and a preparation finally obtained which is quite flat and free from wrinkles, and the whole of which can be examined with high magnifying powers.

The time and labor required for histological investigations of this description are very great, and I have not attempted to make an exhaustive examination of all the peripheral organs in every case. In one case, however, in which the clinical symptoms were of the “pyæmic type,” and in which infective emboli were scattered in extraordinary numbers throughout the body, a thorough examination of all the organs was made.

The clinical history of this case was as follows :

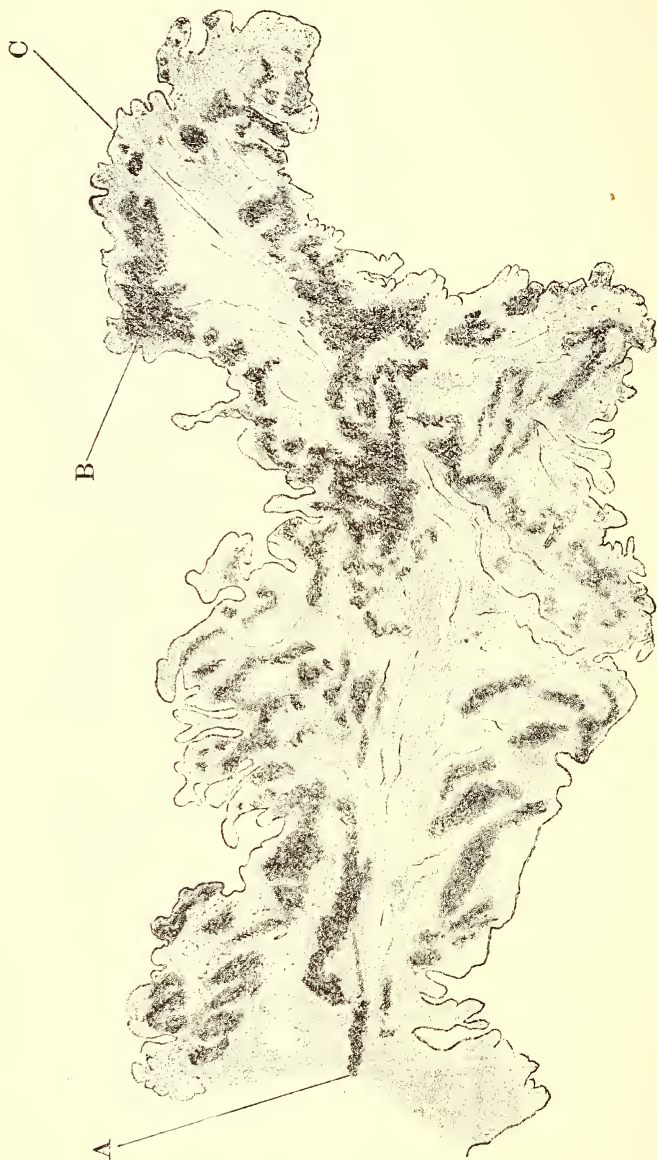
CASE. Robert Hardie, æt. thirty-four, was admitted to the Edinburgh Royal Infirmary, under the care of Professor Annandale (to whom I am indebted for the clinical history of the case), on October 18, 1884, suffering from a urethral stricture and perineal abscess.

The abscess was evacuated with proper precautions, on the day of admission, and soon healed without febrile disturbance or other untoward symptoms.

On Nov. 10th, the stricture was divided internally by Maisonneuve's method; the operation was followed by ups and downs in temperature,

albuminuria, well-marked cardiac murmurs, and symptoms of cerebral meningitis.

FIG. 6.



Camera lucida drawing of a section of a cardiac vegetation in ulcerative endocarditis, showing masses of micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 4; tube in; and drawing reduced from 7 to $5\frac{1}{2}$ inches. A, points to the base of the vegetation; C, to its free end; B, to a dense mass of micrococci stained blue with the methyl-violet; the light parts of the vegetation are in the actual preparation stained red by the eosine; the dark portions are large masses of micrococci.

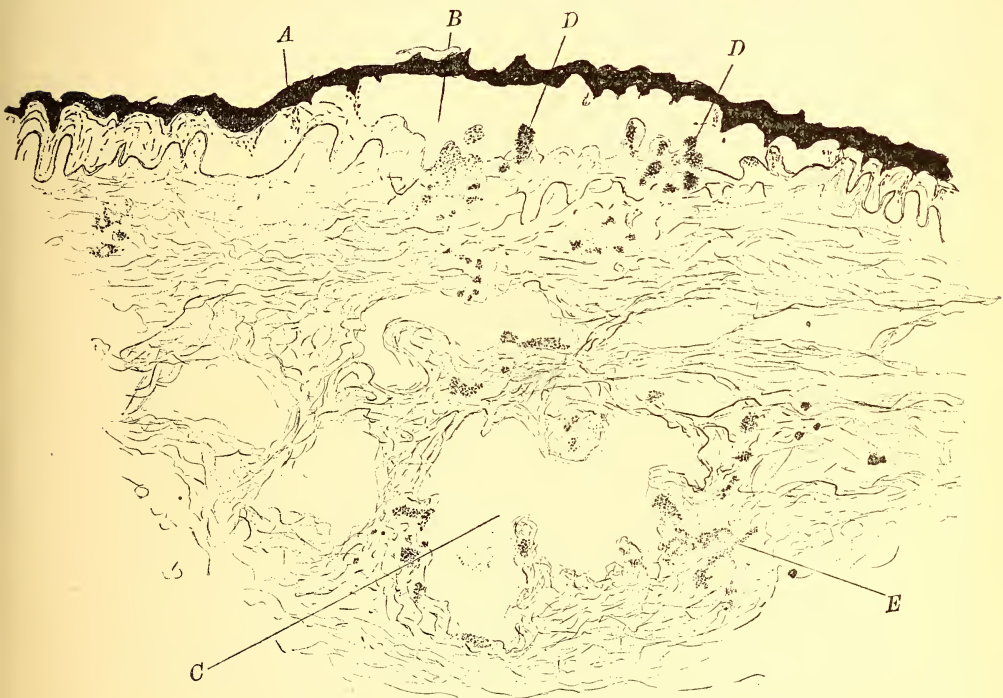
On Nov. 24th, the patient died. The *post-mortem* examination was made forty-eight hours after death, the abdomen being very slightly green at its lower part from commencing decomposition. There were no internal signs of putrefaction. There was no inflammatory lesion in the

position of the perineal abscess; and the urethra, except that a band of mucous membrane extended longitudinally along it at the seat of the stricture, appeared to be healthy.

The naked-eye lesions which were found, were as follows:

Heart: Aortic valve, all segments covered with very soft and luxuriant vegetations, the intercoronary segment ulcerated through, cone-diameter 1.05; mitral valve healthy, cone-diameter 1.7; tricuspid valve healthy, cone-diameter 2; pulmonary valve healthy, cone-diameter 1.25; weight

FIG. 7.



Camera lucida drawing of a section of the skin in ulcerative endocarditis, showing numerous masses of micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 4; ocular 3; tube out; and drawing reduced from 7 to 5 inches. The section was made through a purpuric patch and small abscess in the subcutaneous cellular tissue. A, free surface of the skin, which always contains organisms, and is consequently deeply stained of a blue color. B, points to the purpuric patch; the cuticle is separated from the cutis (D, D₁), which contains large masses of micrococci. C, small abscess in the subcutaneous tissue; numerous masses of micrococci (E) are seen in the wall of the abscess and in the surrounding tissue.

of heart $9\frac{1}{2}$ ozs.; left ventricle 4 in. long, wall $\frac{5}{8}$ in.; right ventricle, length $3\frac{1}{2}$, wall $\frac{1}{8}$. *Spleen*: 1 lb. 1 oz.; very soft, of a rusty brown color; in places yellow and apparently in a state of commencing supuration. *Kidneys* weigh 8 ozs.; numerous small projecting abscesses on the surface surrounded by a ring of softening and congestion; on section many streaks of inflammation extending through the cones to the cortex, and forming large wedge-shaped inflammatory lesions, in the midst of which the small abscess points, previously described, were sit-

FIG. 8.



FIG. 9.

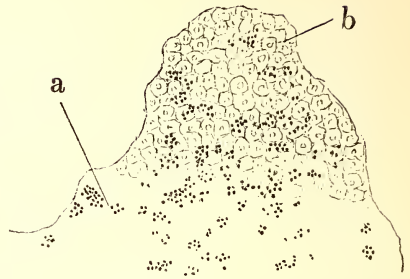


FIG. 8.—Camera lucida drawing of a minute portion of a cardiac vegetation in ulcerative endocarditis, showing enormous numbers of micrococci, in masses (d) and scattered throughout the tissue. Stained with methyl-violet and eosine, and mounted in zylol balsam. X Hartnack, objective 9; ocular 3 tube out.

c, free surface of the vegetation.

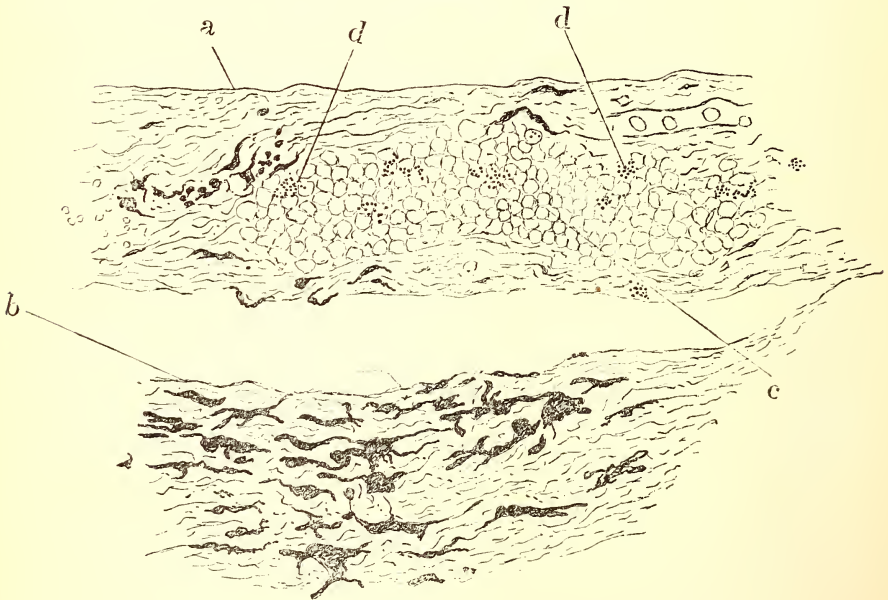
NOTE.—To see the individual micrococci, the drawing should be held about six inches from the eye.

FIG. 9.—Camera lucida drawing of a section of a papilla of the skin in ulcerative endocarditis, showing micrococci in clusters and scattered. Stained with methyl-violet and eosine, and mounted in zylol balsam. X Hartnack, objective 9; ocular 3; tube out.

NOTE.—To see the individual micrococci, this drawing should be held about six inches from the eye.

At a the micrococci are only represented; at b the cells of the tissue (pus cells?) have been drawn in.

FIG. 10.



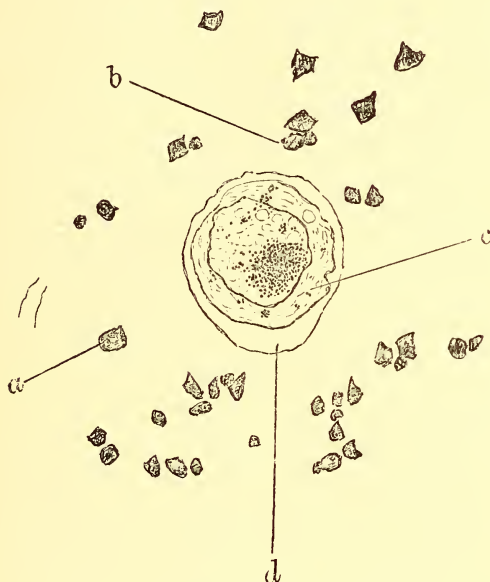
Camera lucida drawing of a section of the choroid coat of the eyeball in ulcerative endocarditis, showing micrococci in the midst of pus cells. Stained with methyl-violet and eosine, and mounted in zylol balsam. X Hartnack, objective 9; ocular 3; tube out.

a, free surface of the choroid from which the retina has been detached; b, deeper layer of the choroid, containing stellate pigment cells; c, collection of pus cells, in the midst of which numerous micrococci (d, d) are situated.

NOTE.—To see the individual micrococci, the drawing should be held about six inches from the eye.

uated ; weight: right 8 ozs., left 9 ozs. *Lungs*: a few old adhesions at both apices, very congested, œdematous and friable; commencing pneumonia; weight: right 1 lb. 13 ozs., left 1 lb. 10 ozs. *Brain*: here and over the vertex, more especially at the top of the left frontal lobe, also over the base, numerous small punctiform ecchymoses and patches of increased vascularity in the membranes; embolism of middle cerebral artery, commencing softening of the Island of Reil; punctiform hemorrhages here and there in the gray matter of the hemispheres; weight, 3 lbs. 5 ozs. Two or three small hemorrhages in each retina. *Skin*: Purpuric

FIG. 11.



Camera lucida drawing of a section of the superficial layer of the gray matter of the brain in ulcerative endocarditis, showing an artery which contains micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 9; ocular 3; tube out.

a, b, corpuscles of the neuroglia and small nerve cells; *c*, artery, the walls of which are thickened; the vessel is filled with red blood-corpuscles, and contains numerous micrococci which have been drawn rather larger than they are in the actual specimen, in order that they may show in the woodcut; there are also some micrococci in the arterial coats; *d*, lymphatic space surrounding the vessel.

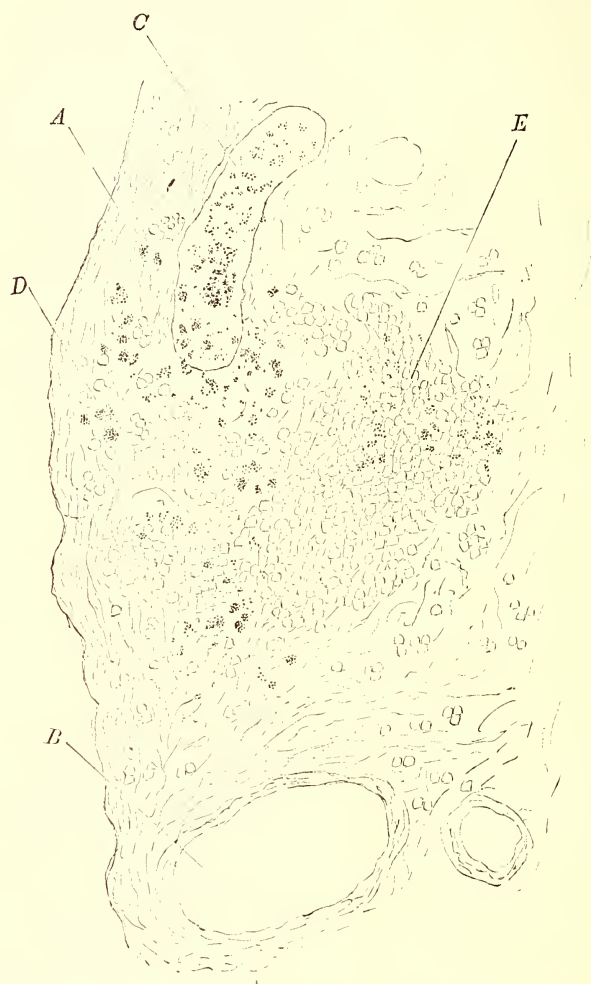
spots on the fingers, small abscess on left forearm. *Liver*: 4 lbs. 3 ozs., fatty. *Urethra*, which had been divided by internal cutting operation for stricture, free from any inflammatory condition; a ridge of mucous membrane seemed to extend along the canal for some distance. Some inflammatory swelling of left testis, but no distinct abscess.

Portions of the cardiac vegetations, spleen and kidneys, were placed in clean glass-stoppered bottles and immediately sent to Mr. Hare, and formed the material with which the first series of his cultivation and inoculation experiments were made. (See Mr. Hare's report, page 44.)

Portions of all the tissues and organs were hardened both in absolute alcohol and in Müller's fluid. On subsequent microscopical examination,

micrococci were found in immense numbers in the cardiac vegetations, kidneys, membranes of the brain, cortex of the brain, choroid coat of

FIG. 12.



Camera lucida drawing of a section through the membranes of the brain in ulcerative endocarditis, showing numerous collections of micrococci in the midst of pus cells and in a vein. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 9; ocular 3; tube out; drawing afterward reduced from 6 to $4\frac{3}{4}$ inches.

A, free surface of the portion of the membranes dipping down between two convolutions; *B*, large artery at the bottom of the sulcus; *C*, vein containing numerous micrococci; *D*, mass of micrococci; *E*, pus cells, in the midst of which there are numerous micrococci.

the eye, skin, and testis. I failed to detect micrococci in the infarction which plugged the left middle cerebral artery, and in the liver.

FIG. 13.



Camera lucida drawing of a section of the cortex of the brain in ulcerative endocarditis, showing a patch of cerebritis, and a large mass of micrococci in the adjacent brain-tissue. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 8; ocular 3; tube out.

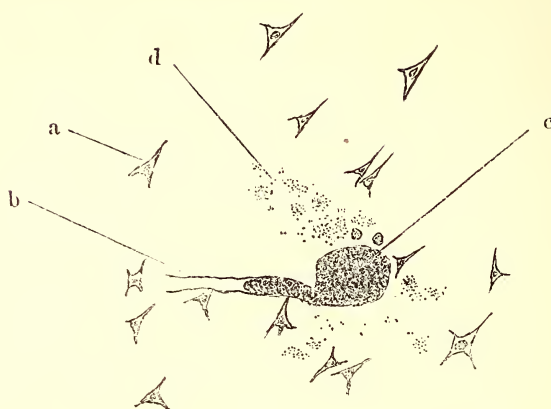
d, The portion of the gray matter affected with acute cerebritis; b, healthy portion of gray matter containing pyramidal nerve cells, the neuroglial basis is not shown in the drawing; e, transversely divided vessel; e, mass of micrococci extravasated around a small vessel.

FIG. 14.



Camera lucida drawing of a section of the gray matter of the brain in ulcerative endocarditis, showing a small vessel (f) plugged with micrococci, and large pyramidal nerve-cells (e). Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 9; ocular 3; tube out.

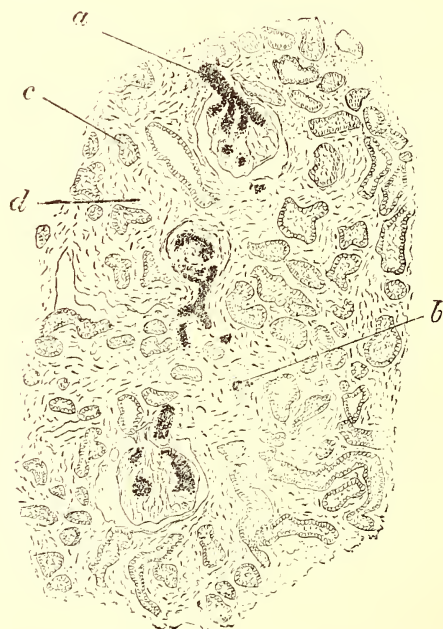
FIG. 15.



Camera lucida drawing of a section of the gray matter of the brain in ulcerative endocarditis, showing a bloodvessel plugged with micrococci, and micrococci in the adjacent brain-substance. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 9; ocular 3; tube out.

a, Small pyramidal nerve cell; b, capillary vessel plugged with micrococci; c, a larger vessel (from which the capillary springs), also plugged with micrococci; d, micrococci in the brain-substance.

FIG. 16.



Camera lucida drawing of a section of the cortex of the kidney in ulcerative endocarditis, showing three Malpighian tufts, the vessels of which are plugged with micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 4; ocular 3; tube out.

a, Vessel proceeding to the Malpighian tuft at the top of the drawing, stuffed with micrococci; b, a mass of micrococci in the intertubular tissue, which is infiltrated with round cells not shown in the drawing; c, transversely divided renal tubule; d, intertubular tissue.

FIG. 17.



Camera lucida drawing of a section through the cortex of the kidney in ulcerative endocarditis, showing numerous masses of micrococci stained with methyl-violet and eosine; and mounted in zylol balsam. \times Hartnack, objective 4; ocular 3; tube out; and drawing reduced from $7\frac{1}{2}$ to 6 inches. Plugs of micrococci, represented as black masses, fill the small vessels, and masses of micrococci are situated in the large veins. The intertubular connective tissue is much increased and infiltrated with round cells, which are not represented in the drawing.

a, free surface of the capsule; *b, b*, transversely divided renal tubules; *c*, inflamed Malpighian tuft; *d*, empty Malpighian capsule; *e*, large artery longitudinally divided; *f*, longitudinally divided vein containing micrococci in masses; *g, g, g*, masses and plugs of micrococci.

The accompanying figures, which are exact photographic reproductions of camera lucida drawings made by myself, show the appearance which sections of the different organs presented, and render any further description than that which is attached to the woodcuts, unnecessary.

Micrococci have been drawn rather larger than the actual size, in order that they might be distinctly seen in the woodcuts. The magnifying power was, as a rule, a No. 9 immersion, Hartnack, eye-piece No. 3, and tube drawn out.

FIG. 18.

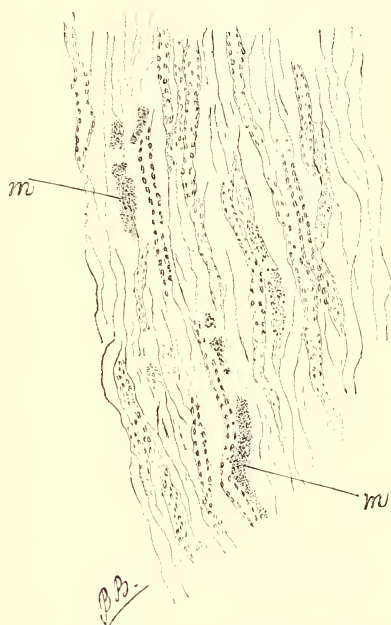


FIG. 19.

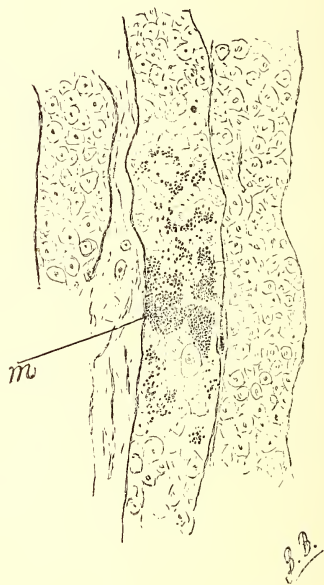


FIG. 18.—Camera lucida drawing of a longitudinal section through the pyramidal portion of the kidney in ulcerative endocarditis, showing masses of micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 4; ocular 3; tube out.

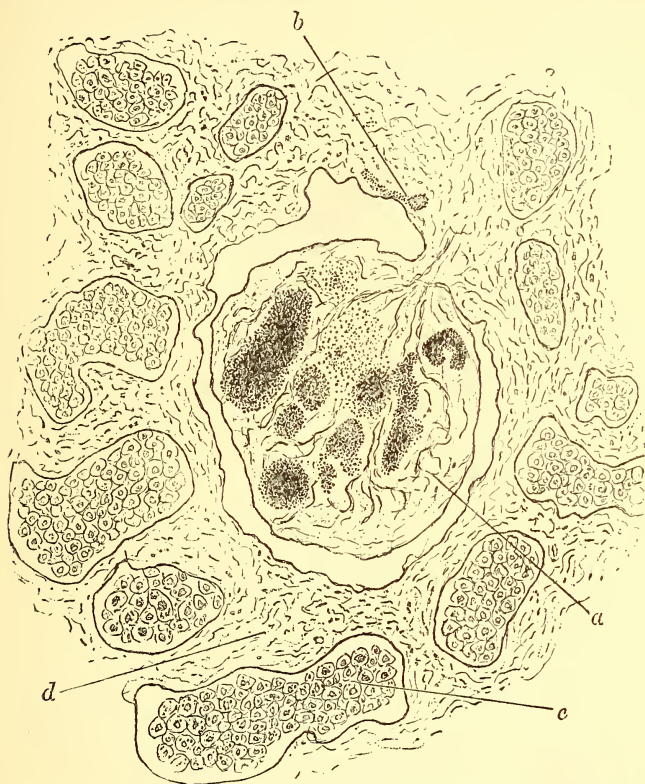
m m, micrococci masses.

FIG. 19.—Camera lucida drawing of a longitudinal section through the pyramidal portion of the kidney in ulcerative endocarditis, showing three renal tubules, the central one containing micrococci (*m*). Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 9; ocular 3; tube out.

The frequent association of acute croupous pneumonia with ulcerative endocarditis is of great interest from an etiological point of view, as Osler has so forcibly pointed out in his admirable Gulstonian Lectures. In two of the three cases in this series, in which well-marked acute croupous pneumonia was present, I detected micrococci in the exudation filling the air-cells of the lung, but I failed to satisfy myself that they were identical with the micrococci in the cardiac vegetations. The

micrococci in the air-cells appeared to be larger than the micrococci in the vegetations. My observations, however, on this point have not as yet been sufficiently accurate or extensive to enable me to form a satisfactory judgment; and in the mean time I reserve my opinion on the

FIG. 20.

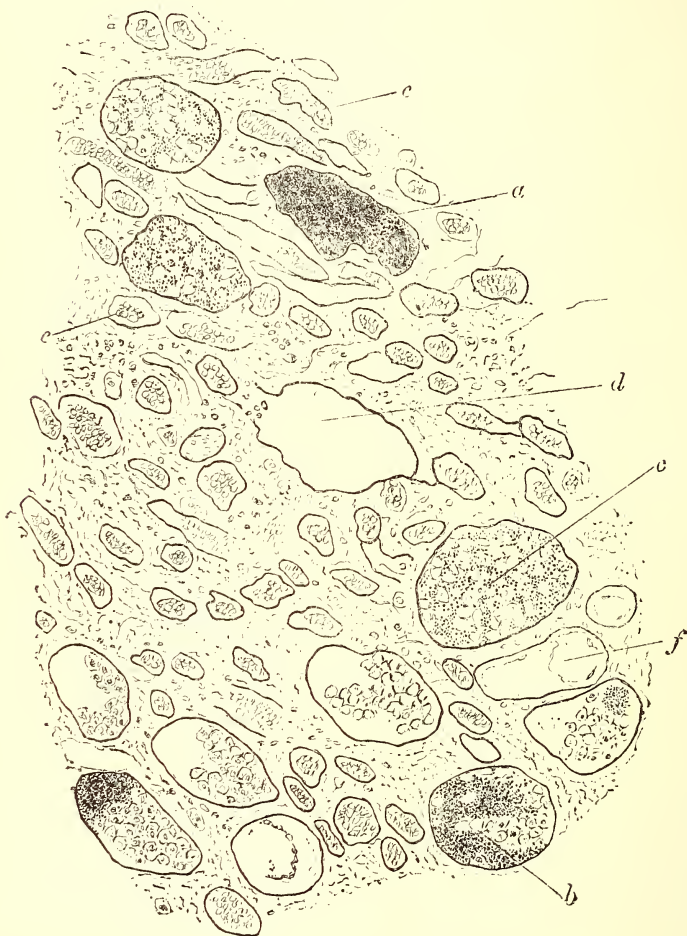


Camera lucida drawing of the cortex of the kidney in ulcerative endocarditis, showing a Malpighian tuft stuffed with micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 8; ocular 3; tube out; and drawing reduced from 4 to $3\frac{1}{4}$ inches. *a*, Malpighian tuft, the vessels of which are plugged with micrococci; *b*, small vessel, passing (?) to the Malpighian tuft, plugged with micrococci; *c*, renal tubule filled with epithelial cells, the outlines of which are more sharply defined in the drawing than in the preparation; *d*, interstitial tissue between the tubules, infiltrated with cells which are omitted from the drawing.

point. Probably this interesting question is more likely to be decided by cultivation and inoculation experiments than by simple microscopical examination. My pathological experience clearly shows that during certain seasons (during certain years or certain months) acute croupous pneumonia and ulcerative endocarditis are apt to prevail, but I have not found that when acute croupous pneumonia is epidemic, if I may be allowed to use the term, that ulcerative endocar-

ditis also prevails. My experience in this matter is shown in the Table. I can, however, confidently say that during the past year, when ulcerative endocarditis seemed to be unusually prevalent in Edinburgh, the number

FIG. 21.



Transverse section through the pyramidal portion of the kidney in ulcerative endocarditis, showing transversely divided tubules containing micrococci. Stained with methyl-violet and eosine, and mounted in zylol balsam. \times Hartnack, objective 9; ocular 3; tube out; and drawing reduced from $5\frac{1}{2}$ to $4\frac{1}{2}$ inches.

a, "Collecting tube" stuffed with micrococci; *b*, tube containing numerous micrococci in clusters and scattered between the cells; *c*, tube containing scattered micrococci and cells; *d*, empty tube; *e*, bloodvessel; *f*, hyaline cast in a renal tubule.

The epithelium of most of the tubes is proliferating; the intertubular tissue is infiltrated with round cells, the majority of which have, for the sake of clearness, been omitted from the drawing.

NOTE.—For the sake of clearness, the individual micrococci are represented larger than the actual size.

of so-called septic cases which came under my notice was decidedly above the average.

TABLE SHOWING THE MONTHLY DISTRIBUTION OF THE CASES OF ACUTE CROUPOUS PNEUMONIA AND ULCERATIVE ENDOCARDITIS, WHICH WERE EXAMINED POST-MORTEM IN THE EDINBURGH ROYAL INFIRMARY DURING THE YEARS 1882-83, 1883-84, AND 1884-85.

Month.	1882-83.		1883-84.		1884-85.	
	Pneumonia.	Ulcerative endocarditis.	Pneumonia.	Ulcerative endocarditis.	Pneumonia.	Ulcerative endocarditis.
November,	2	1	2	0	0	2
December,	4	0	1	1	2	0
January,	3	0	1	0	2	0
February,	5	0	2	0	0	1
March,	4	1	2	0	2	0
April,	4	0	4	0	0	0
May,	4	0	1	0	1	3
June,	3	0	3	0	0	0
July,	2	0	1	1	5	0
August,	0	0	1	1	0	0
September,	2	0	0	0	0	0
October,	0	1	2	0	4	2
Total,	33	3	20	3	16	8

The detection of micrococci in the inflamed cerebral meninges, and in the vessels and substance of the cerebral cortex, and the presence of disseminated patches of cerebritis and acute cerebral softening, are very interesting; and afford a satisfactory explanation of the nervous symptoms which are so prominent in some cases of the disease.

The following is the brief record of a very striking and interesting case, in which the symptoms were of the type which Osler has termed "*cerebral*." I am indebted for the clinical record of this case to my friend, Dr. Berry Hart:

CASE. *Endocarditis of the Cerebral Type*—A. B., aged thirty-one, was seen by Professor Simpson and Dr. Berry Hart for three days only before his death. A week previously Professor Simpson happened to meet the patient by chance, and seeing that he looked ill, advised him to go to bed. Instead of taking Professor Simpson's advice, he went to the country, and only returned to town because no improvement took place. His friends stated, that for some weeks previously he had been greatly out of sorts, complaining of feebleness, suffering from shivering and loss of memory, and that, on one occasion, he had fainted.

He was first seen by Professor Simpson and Dr. Berry Hart on the evening of November¹ 8, 1884. The temperature was then 103.4° F.;

¹ It is interesting to note that during the month of November, 1884, two fatal cases of ulcerative endocarditis occurred in the Edinburgh Royal Infirmary.

but with the exception of a well-marked presystolic mitral murmur, there were no physical signs of localized disease.

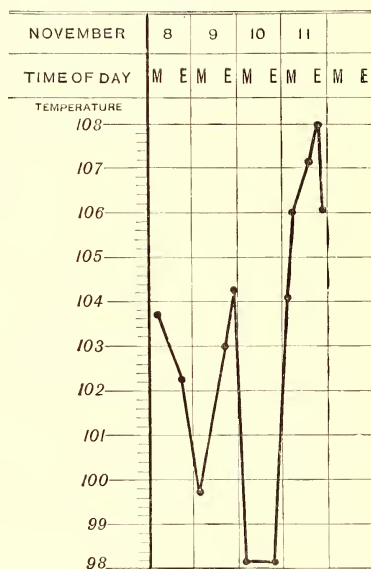
On the morning of the 9th the temperature was 99.8° , and he was troubled with a short cough. Examination of the chest failed to reveal any other physical signs than the presystolic inurmur previously described.

On November 10th he seemed better, and the temperature, both morning and evening, was normal.

At 4 A. M. on the 11th, and again at 8.30 A. M., he was seized with a rigor, the temperature rising to 104° F.

At 12.45 P. M., violent delirium set in, with tetanic spasms (opisthotonus), and localized convulsive movements of both arms and of the muscles of expression. The temperature rose to 108° F., and death took place at 5.30 P. M.

FIG. 22.



Temperature chart in the case of A. B., ulcerative endocarditis of the cerebral type.

Post-mortem Examination. Through the kindness of Dr. Berry Hart, I was able to make a post-mortem examination on November 13th. The body was well nourished and muscular. The *mitral valve* presented a well-marked, funnel-shaped contraction admitting with difficulty the forefinger. The auricular surface of the valve was eroded, the margins of the ulcer being covered with a thin layer of recent vegetations; the wall of the left auricle was hypertrophied, but the cavity was in no way dilated; the heart was in other respects normal.¹

¹ This case was a remarkable example of "latent" mitral stenosis in which compensation was unusually perfect. It was known that the patient had had a cardiac murmur in childhood; but he subsequently manifested no symptoms of the heart disease; he presented all the appearances of good health: was active, muscular, and had been a good "oar." Shortness of breath, cyanosis, dropsy, and other symptoms which are apt to occur in advanced mitral cases, were completely absent.

The *spleen* was soft and pulpy and greatly enlarged; its exact weight was not ascertained, but it must have been more than one pound. The *membranes of the brain* presented here and there evidences of commencing meningitis, the other organs were normal.

Microscopical Examination. The nerve cells of the cerebral cortex were found to be markedly fatty, but no appearances of cerebritis (such as were present in the case of Robert Hardie, previously described) were found; there was well-marked commencing meningitis; micrococci were detected in the inflamed membranes, but not in the vessels or substance of the cortex. (Whether the fatty degeneration of the nerve cells of the brain was of recent origin; whether it was due to defective blood supply the result of the acute cardiac lesion which had evidently been slowly progressing for some weeks previous to the onset of meningitis; and whether this fatty degeneration of the nerve cells was the only cause of the loss of memory, which was most marked, it is, of course, impossible to say. B. B.)

Remarks by Dr. Berry Hart. This case was exceedingly puzzling, and with the single physical sign of a presystolic murmur, the anomalous crisis on November 10th, as well as the absence of all evidences of emboli, it was exceedingly difficult to come to any definite conclusion. The patient seemed so well on November 10th that we felt that our previously expressed opinion of ulcerative endocarditis was almost unwarranted. We did not attach sufficient importance to the enlargement of the spleen. It is possible that a microscopical examination of the blood might have been helpful. The treatment adopted consisted of the administration of antipyretics, and, at the last, of the free application of iced cloths to the surface of the body.

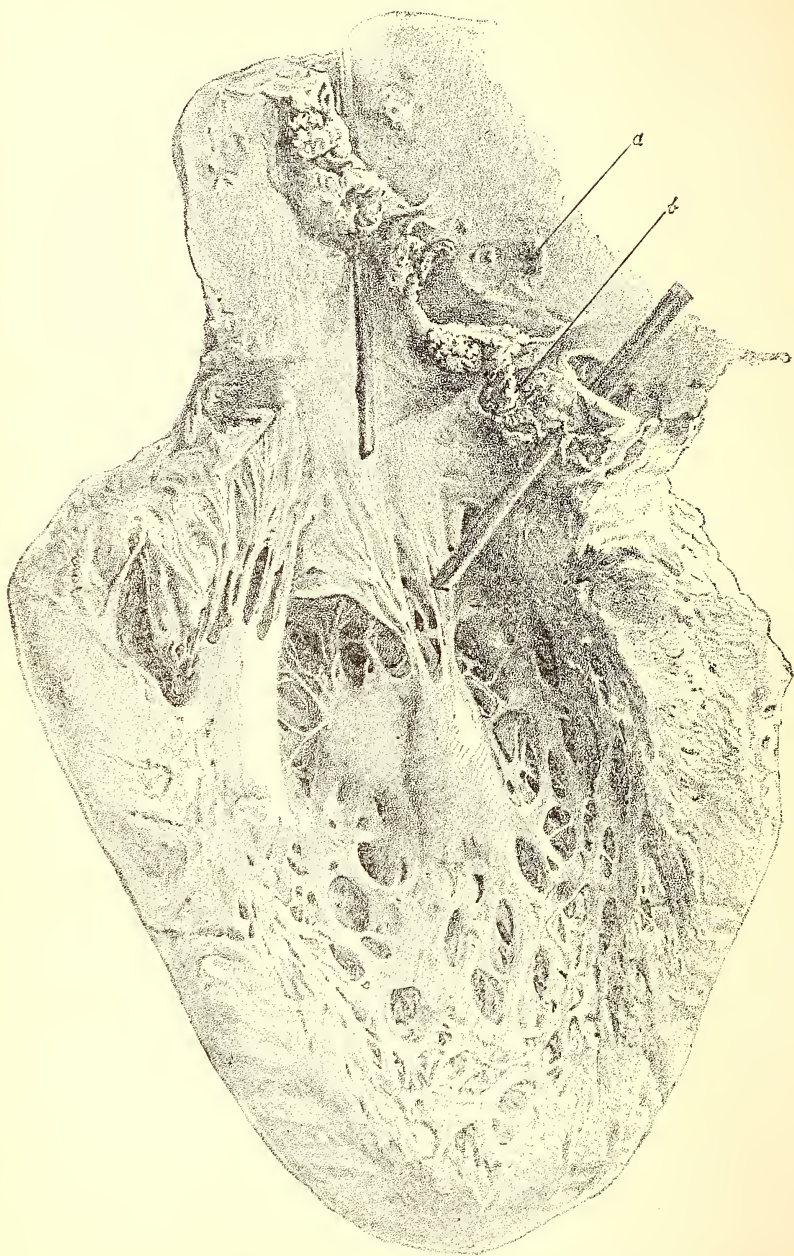
While I am referring to the clinical history of ulcerative endocarditis, it may not be out of place to record briefly three cases of the "cardiac type," under which term I include not only those cases in which patients the subject of chronic valve disease are attacked with febrile symptoms and evidences of a recent endocarditis engrafted upon the old process, but all cases in which the cardiac symptoms are striking and prominent.

CASE. Ulcerative Endocarditis of Cardiac Type.—James Naggs, æt. thirty-nine, a street porter, was admitted to the Tynemouth Union Workhouse, under my care, on October 15, 1873, complaining of shortness of breath, cough, and great debility.

Previous History. The patient stated that he had always enjoyed good health, never having been in bed through sickness for a single day until a week ago, when he got wet through, and allowed his wet clothes to dry on him. The next day he was "all of a tremble," felt cold, was sore, and pained all over his body, as if he had been beaten with sticks, began to cough, and had a stitch in the side. He applied to the dispensary and got some medicine which did him no good; in two days he was so weak that he could not stand, and consequently applied for admission to the workhouse hospital. Has never had rheumatism, nor rheumatic fever. Has been a tolerably hard drinker.

State on Admission. Is so weak that he can neither walk nor stand; has a frequent, short, dry cough; complains of pain in the left knee, which is swollen; has had some sweating; is extremely short of breath,

FIG. 23.



Aortic valve in the case of ulcerative endocarditis (James Naggs) detailed in the text.

The aortic cusps are thickly coated with vegetations; two of the segments are ulcerated through, pieces of whalebone being placed in the apertures. The letter *a* points to a small depression (a commencing aneurism) surrounded by minute vegetations at the base of the aorta, and has evidently been produced by the vegetation *b*, which at every systole would be forcibly washed against the aortic wall at this spot.

and very pale, the conjunctivæ and lips being almost bloodless; the feet and legs are œdematous.

Physical Examination. There is marked, visible, jerking pulsation in the carotids; the visible impulse of the heart is larger than normal; the apex is situated in the fifth interspace; a double bellows murmur, the systolic portion being most distinct, is audible at the base of the heart. The temperature is 101.3° F. There are no signs of pulmonary disease or other complications.

Progress of the Case. Under rest, nutritious diet, alcoholic stimulants freely administered, digitalis, and quinine, there was considerable improvement; the temperature became normal; the rheumatic swelling of the knees and the œdema of the feet and legs disappeared; and the patient was able to sit up for the greater part of the day. Toward the middle of November the shortness of breath and debility, which from the first had been such prominent symptoms, increased, and necessitated his lying in bed; the pallor was now more marked even than on his admission.

The heart was now distinctly enlarged, the apex beat being placed in the sixth interspace, and the area of cardiac dulness increased. The double aortic murmur, though still audible, was much less loud; the radial pulse was 104, very weak, at times almost imperceptible. The skin was cool, the rectal temperature was 101.5° F.; sweating at night was a troublesome symptom.

November 29. The patient had a very bad night, the shortness of breath being very great; fine crepitations are to-day audible over both lungs; the radial pulse is 98; temperature normal.

He died suddenly, apparently from syncope, at 6 P. M.

Post-mortem Examination. 30th. Body very thin; an excess of fluid in the pericardium and in each pleura; no subcutaneous dropsy; both legs œdematous; very marked disease of the aortic valve (see Fig. 23); the heart moderately enlarged, the left ventricle being dilated and hypertrophied; the liver slightly cirrhotic and markedly nutmeg, kidneys healthy; spleen large and congested.

CASE. Ulcerative Endocarditis of Cardiac Type.—A. B., aged twenty-one, was seen by me in consultation with my friend, Dr. Croom, on January 17, 1885, suffering from rheumatic fever and endocarditis.

She had consulted Dr. Croom for anæmia a fortnight previously; and two days after her visit had been seized with rheumatic fever. The attack was a severe one, and a mitral systolic murmur and great shortness of breath developed at an early stage of the case.

Under salicylate of soda the joint affection rapidly subsided, and at the time of my visit had almost entirely gone; the temperature, however, still kept up, being 102.2° F.; the breathing was very short and frequent, and fine crepitant and sibilant râles were audible all over the chest; the heart, more especially the right side, seemed considerably enlarged, and a systolic murmur, which was loudest at the left apex, was conducted back to the spine; a faint tricuspid systolic murmur was also audible; there was no pericardial friction.

Under quinine, alcoholic stimulants, ipecacuanha, and digitalis, there was some slight, but only temporary improvement. The difficulty of breathing became more marked; the area of cardiac dulness—apparently the result of acute dilatation, and not of pericardial effusion—became greater.

On January 28th she had a rigor. On the 29th she became hysterical, laughing and crying alternately, and being eccentric, both in her manner and talk, it was obvious that some cerebral complication was developing. There was well-marked inflammation of the right parotid gland.

On the 30th symptoms of cerebral meningitis were distinct, and death took place.

There was no *post-mortem* examination.

Remarks. The rapid development of very free mitral regurgitation; the marked pulmonary engorgement; the rigors; and the occurrence of cerebral meningitis and of parotitis, leave little doubt that in this case the endocarditis was of the ulcerative type. The occurrence of ulcerative endocarditis in the course of ordinary rheumatic fever, and where the heart was previously healthy, is, according to Osler, rare; it is well, however, to remember that it does occasionally occur, and in any case of acute rheumatism in which very free mitral regurgitation, or still more when very free aortic regurgitation is quickly established, the heart having been previously healthy, the presence of the ulcerative forms of endocarditis should, I think, be strongly suspected.

CASE. Ulcerative Endocarditis of Cardiac Type.—Robert Reid, æt. ten, was admitted to the Edinburgh Royal Infirmary under the care of Dr. Miller (to whom I am indebted for the clinical record of the case) on April 13, 1885, suffering from a swelling of the left forearm.

Previous History. The swelling was first noticed about a fortnight ago; it arose spontaneously without any injury or other obvious cause; for some time before admission the patient had not looked or felt well; immediately in front of the door of the cottage in which he lived, there is said to be an untrapped drain.

History after Admission. The patient was markedly pale and anæmic; the evening temperature on April 13th was 101.5° F.

15th. Dr. Miller made a longitudinal incision over the swelling and removed a large blood-clot, which weighed about 8 ounces; a bleeding opening was found in what appeared to be the ulnar artery; the vessel was ligatured above and below, and the wound dressed antiseptically.

On the evening of April 15th, the temperature was 100.8° F., and on that of the 16th 102° F.; five grains of quinine were prescribed.

The morning temperature continued to be about normal and the evening temperature varied from 101° to 102° F., until April 26th, when it reached 103° F. The wound was progressing most favorably.

22d. Dr. Wylie examined the patient, and found a mitral systolic and an aortic diastolic murmur; he diagnosed the case as one of ulcerative endocarditis.

The wound continued after this date to heal satisfactorily, but the anæmia, shortness of breath, and extreme debility gradually increased; the temperature continued to fall in the morning and to rise at night; on the evening of May 3d it reached 104° F.

May 21. Dr. Miller very kindly afforded Mr. Hare and myself an opportunity of seeing the patient and of examining the blood. The patient at the time of our visit was extremely short of breath; exceed-

ingly pale, and drowsy from cerebral anæmia. The arterial system was very imperfectly filled with blood, pulsation in the carotids was very visible, jerking and collapsing; there was some swelling of the feet. The heart was considerably enlarged; a soft systolic murmur was present in the mitral area, and a very faint and short diastolic murmur could just be heard at the base of the heart. The area of splenic dulness appeared to be increased; there seemed to be no other complications.

The result of the examination of the blood is detailed in Mr. Hare's report. (See page 48.)

22d. The patient died at 3.15 A. M.

The post-mortem examination was made nine hours after death. Small old adhesions at apex; aortic valve highly incompetent, covered with vegetations; intercoronary segment ulcerated through, vegetations soft and luxuriant, cone diameter 7; mitral valve, small vegetation in each segment, cone diameter 1.2; tricuspid valve healthy, cone diameter 0.95; pulmonary valves normal; weight of heart $11\frac{1}{2}$ ounces; ventricles dilated and hypertrophied. Spleen firm. Malpighian bodies very prominent; color dark purple; one small yellow infarct; kidneys normal to naked eye. Lungs: straw-colored fluid in pleura; some adhesions between lobes; on section, very rose colored, cedematous, and congested at base; on the posterior surface of the lower lobe an area, one inch in diameter, showing small yellow nodules in interlobular septa. Brain normal, excepting some excess of subarachnoid fluid; some micrococci in cardiac vegetations (Mr. Hare's report); none detected in spleen, or in clots, after hardening, contained in aneurism of the radial artery which had been ligatured.

CULTIVATION AND INOCULATION EXPERIMENTS.

Being firmly of opinion that the etiology of ulcerative endocarditis and the relationship of the disease to other infective conditions are more likely to be determined by experimental means than by any other method—an opinion which Professor Osler has since expressed in his *Gulstonian Lectures*—I requested my friend Mr. Hare to have the kindness to undertake this part of the investigation. Mr. Hare responded to my request with alacrity, and has devoted a large amount of time and labor to the matter. Although the results which he has obtained are as yet, for the most part, negative, they are undoubtedly of great value and interest.

It may not be out of place to quote Osler's summary of the results of previous experiments. "In the way of experimental investigation of the properties of the micrococci," he says, "not much has been done of a satisfactory nature. Heiberg placed bits of vegetations from a puerperal case beneath the skin and in the peritoneal cavity of a rabbit, without effect. Eberth, Birch, and Hirschfeld have produced panophthalmos in the rabbit by inoculating the cornea; and I was able to produce well-marked mycotic keratitis in the same animals with fresh material from the valves in two cases. H. Young, of Manchester,

inoculated rabbits with pus from an abscess in ulcerative endocarditis, and was able to detect micrococci in the blood.

"No conclusive culture experiments have yet been made. Grancher has cultivated a microbe from the blood, taken during life with all necessary precautions, but apparently not in series, and no inoculations of animals were made. Cornil has made cultures in gelatine, but apparently no special results have been obtained."

Mr. Hare informs me that the yellow micrococcus which he obtained in his first series of experiments resembles very closely, or is identical with the micrococcus of osteomyelitis. This is a point of great interest, for "in acute necrosis of bone or acute osteomyelitis," Osler says,¹ "a secondary endocarditis may develop, and in some instances the clinical features may strongly resemble malignant endocarditis."²

In conclusion, I must take this opportunity of thanking Mr. Hare, not only for undertaking the investigation, but for the opportunities he afforded me of watching the whole inquiry. My thanks are also due to Prof. Chiene for allowing the investigation to be conducted in his laboratory, and for the great interest which he has taken in the research, and to Professor Greenfield and Dr. Woodhead for the facilities which they afforded for carrying on the work.

REPORT.

The following experiments and observations, made with morbid material from certain of the above cases, were carried out by Mr. A. W. Hare, Assistant to Professor of Surgery, at the Bacteriological Laboratory of the Surgical Department in the University of Edinburgh, through the courtesy of Prof. Chiene.

First Series (November, 1884).

These observations were made with material from a case of ulcerative endocarditis (case of Robert Hardie), in which there was a widespread distribution of miliary abscesses in the liver, spleen, and other solid viscera. At the post-mortem examination, portions of these organs were transferred to clean glass bottles, and at once sent to the University for examination.

MICROSCOPICAL APPEARANCES.—The contents of the miliary abscesses were first examined microscopically. The pus was spread in thin films upon cover-glasses, and fixed by Baumgarten's method. The pus was then stained by Gram's double stain (gentian-violet and eosine). Under a power of 700 diameters (Zeiss $\frac{1}{12}$ inch homog. immers.) it was observed that the contents of the abscesses consisted of pus cells and

¹ Loc. cit., p. 507.

² Loc. cit., p. 459.

granular débris, together with considerable quantities of a small-sized spherical micrococcus. These organisms appear chiefly as rounded clusters with from 6 to 20 cocci in each;¹ a few tetrads are also present, and some diplococci, whilst at intervals in the specimens examined monococci are seen. In whichever of these arrangements the organism is observed, the individual unit is uniform in its size, and is of very minute dimensions, measuring very little more than $1\ \mu$ in diameter. It takes on any of the aniline dyes, whether acid or alkaline, very easily, and is beautifully demonstrated by Gram's stain.

CULTIVATIONS IN ARTIFICIAL MEDIA.—These were undertaken in the hope of obtaining a pure cultivation of the micrococcus found in the miliary abscesses, with a view to testing further the characters of that organism. For this purpose sterile tubes of Koch's peptonized jelly, and sterile potatoes in glass bell-jars were employed as nutrient soil. A portion of the fresh kidney was divided by a sterile (superheated) knife, in a still atmosphere, the table and the operator's hands being purified with corrosive sublimate solution (one per cent.). Several of the abscesses were thus opened, and a small particle of pus was abstracted from the centre of each on the tips of a series of sterilized platinum wires. With the seed material thus separated, a series of tubes of jelly and of sterile potatoes were inoculated.

RESULT IN JELLY.—One tube reacted, three did not. The tube which reacted showed the following appearances. A gray, finely granular prolongation was seen running down in the gelatine in the line of inoculation. On the seventh day liquefaction set in, and gradually a funnel-shaped liquefied part formed in the centre of the gelatine. At the tenth day the whole circumference of the top of the gelatine was involved in this process, and liquefaction in four weeks had extended to the bottom of the tube, where a fine, amorphous, yellow-gray precipitate was deposited. This yellow-gray deposit was examined microscopically, and found to consist mainly of micrococci of small size; many of these were bereft of life, as was evidenced by the faint staining reaction resulting on the addition of methyl-violet, and large quan-

¹ This prevailing arrangement of the cocci in clusters of spherical shape is also noticed in pus from osteomyelitic and periostitic cases. It is not due to mechanical conditions as is the rounded shape of micrococcus emboli in the circulating blood, for there is no active movement in the contents of an abscess. It must, therefore, be looked upon as a vital peculiarity of these species of micrococci, to which the name of *sphaerococci* might well be applied to differentiate them from other morphological types. The proximate cause of this special feature is to be looked for in the mode of multiplication which is found to occur in the organisms. All micrococci multiply by fission; the cleavage which occurs is either constantly in one plane, producing diplococci or streptococci (chains), alternately in two planes at right angles with one another (tetrads, sarcinae), consecutively in each of three planes at an angle of one hundred and twenty degrees with each other, which produces the sphaerococcus now noticed, or in an indefinite series of planes in which no regular sequence can be traced, giving rise to the type of staphylococcus. This law also holds true, to some extent, of the forms of growth displayed by the same organisms in artificial media, and gives a possible future basis on which a morphological classification of micrococci may be constructed.

tities of amorphous débris, amongst which a number of short, straight bacilli were seen.

Secondary and tertiary cultivations followed the same course, as did also cultivations in gelatine from the growth which had occurred on the inoculated potatoes. (These cultures were used in Experiments 1 and 2.)

RESULT OF INOCULATION OF POTATOES.—On potatoes the organism grew as a yellow-gray, thick, and moist pellicle. In some parts it was more purely yellow, in others a duller drab color. A pure cultivation of the drab variety of organism was procured and used for the inoculation subsequently described. Two attempts to get pure cultivation of the yellow element failed, and it was not used for inoculation experiments till a subsequent date, when, after repeated failures, a pure growth of the yellow organism was obtained.

The gray colored growth was found to consist of short, straight bacilli in immense clusters. (Used in Experiments 3 and 4.) The yellow growth, when first obtained, consisted solely of micrococci of small size, in irregular clusters. This cultivation was employed subsequently in making inoculation experiments; but at the time it was used it had become contaminated and was not pure, having assumed a buff color and lost its bright yellow tint. (Used in Experiment 5.)

INOCULATION EXPERIMENTS.—These were performed in the Pathological Department of the University, through the courtesy of Professor Greenfield and Dr. Woodhead.

A. With cultures in nutrient jelly.

EXPERIMENT 1.—A tube of jelly in which liquefaction was well advanced, and in which there was a yellow amorphous deposit, was employed in this experiment. The liquefied portion and the deposit were thoroughly mixed by agitating the contents of the tube—and fifteen minims of the turbid fluid thus obtained were slowly injected into the largest efferent vein of the left ear of a rabbit. (Plain white.)

CONTROL EXPERIMENT 1 *a*.—A tube of sterile jelly had its contents liquefied by heat, and fifteen minims of its contents were injected into a vein of the ear of another rabbit. (Black back.)

EXPERIMENT 2.—A small pocket was made in the subcutaneous tissue of a rabbit's ear (black and white "spot") and a drop of turbid fluid from the same cultivation introduced.

RESULT.—In no case was there any reaction, local or general. The animals remained in good health, and after some weeks one of them (black back) was used for another experiment (see Experiment 5). The other two were not made use of again in this series of experiments.

DEDUCTIONS FROM RESULT.—Experiment 1 was intended to ascertain if organisms derived from a case of ulcerative endocarditis were capable of giving rise to the disease when they were introduced into the bloodstream of a lower animal.

Experiment 1*a* was intended as a check upon this by ascertaining

whether the constituents of the nutrient media themselves were free from pathogenic properties.

Experiment 2 was devised to obviate the misleading result that might appear in consequence of the immediate devitalization by the blood-stream of foreign elements introduced into it,¹ as is found to be the case with pure cultivations of *bacterium termo*; where the organism is destroyed before it can commence any pathogenetic action. A local focus was therefore established apart from the blood stream, where there was a possibility of the elaboration of products, by absorption of which a secondary infection (autoinoculation, Verneuil) might occur. This was based on the frequency with which ulcerative endocarditis is seen to follow surgical affections in the human subject, the general disease being in these cases secondary to a localized lesion. (This principle was still further developed in Experiment 4.) The negative nature of the results obtained pointed to a series of alternative conclusions, viz.:

1. The organism injected is not a *materies morbi*.
2. The organism cultivated, primarily infective, has become inert :
 - a. From extraneous contamination (presence of bacillus in tubes along with micrococcus);
 - b. From intrinsic alteration due to artificial surroundings.
3. The condition of the animal was not such as to admit of the organism exerting its pathogenetic activity, from the animal possessing :
 - a. Constitutional immunity;
 - b. Vital activity sufficient to throw off the irritant in these particular cases.

With a view to pressing the matter to a further conclusion, the following experiments were planned and carried out.

B. With cultivations on potatoes.

EXPERIMENT 3.—The gray pellicle cultivated on potato was mixed with liquefied sterile jelly, and an emulsion made, and ten minims of the emulsion were injected into the veins of a (gray) rabbit's ear.

EXPERIMENT 4.—Fifteen minims of the same emulsion were injected into the right auricular vein of another rabbit (brown and white). A sterile needle was introduced into the hind leg of this rabbit, and the periosteum of the tibia detached on the anterior surface for one-third the length of that bone.

RESULTS.—The rabbit used in the latter experiment remained in perfectly good health.

The rabbit used in Experiment 3 developed morbid symptoms in twenty-four hours. It had no appetite, was lazy in its movements, and its eyes were dull and bleared. On the second and third days it grew worse, and on the fourth day seemed moribund; it lay on its side, it was not able to move, and its breathing was labored. On the fifth day it seemed to have passed some crisis and was less affected; and on the sixth day it was much better and recommenced to eat, but did so sparingly.

¹ Cf. Hiller's experiments with septic organisms. "Die Lehre von der Fäulniss," Berlin, 1879.

On that day it was killed by dividing the spinal marrow high up, and the state of the organs examined. All the organs were found to be healthy, except the lungs, which showed patches of superficial hemorrhage; kidneys normal; spleen small and shrunken. In the heart, some small pink clots were adherent to the tricuspid valve, resembling vegetations, but containing no micrococci. Blood examined, but no micro-organisms were detected.

DEDUCTIONS FROM RESULTS.—These two experiments were performed to test the pathogenetic activity of the potato cultures; in the latter, a local focus for the action of the organism was provided by the injury to the periosteum, following the plan devised by Becker in his experiments upon infectious osteomyelitis (*Deutsche med. Wochenschr.*, Bd. 9, 1883). The general conclusions are identical with those derived from Experiments 1 and 2.

The rabbit used in Experiment 3 probably suffered from a temporary attack akin to septicæmia, which it threw off on the fifth day. The shrunken spleen points to this conclusion.

These inoculations having been made with the gray film cultivated upon potato, and that film having been subsequently found to consist of bacilli; the yellow film, which had been in the mean time procured pure and found to consist of micrococci, was used as follows:

EXPERIMENT 5.—A portion of the cultivation made from the yellow colored part of previous cultivations, which had recently assumed a gray-ash color owing to the presence of a contaminating bacillus, was scraped off with a sterile knife, mixed with boiled distilled water, and fifteen minims of this emulsion inoculated into the vein of a rabbit's ear (black-backed white rabbit).

RESULT.—No reaction; animal remained perfectly well.

CONCLUSIONS.—The results of this series of experiments are entirely negative. The causes of which these results are the outcome have been already referred to (deductions from Experiments 1 and 2). The two chief features of doubt left are, as to whether these experiments were performed with the supposed *special organism*, and upon a species of animal *susceptible to the disease*. One practical result accrued, however: the decision was come to that in future cases, should they occur, it would be the experimenter's duty to take the organism direct from the local lesion, and introduce it into the circulation or tissues of several species of the lower animals, till one be found liable to an attack of the disease. The difficulties which stand in the way, in this respect, are more of a legal than of an experimental nature.

Second Series (May, 1885).

In this series of experiments, morbid material was made use of from two sources (cases of R. Reid and J. Sweeney). In the former of these cases, the disease was diagnosed during the lifetime of the patient, and

the following observations were made by the kind permission of Dr. A. G. Miller.

MICROSCOPICAL EXAMINATION OF BLOOD.—Cover-glasses were prepared, on each of which was a thin film of the patient's blood, which was stained by Gram's method. Out of six specimens examined under the microscope ($\times 700$), two were found to contain microorganisms in very small numbers. Several fields of the microscope had to be carefully searched before a single specimen of the organism could be detected. The organisms demonstrated were all micrococci, in one or two cases in the dumbbell-form (diplococci), but most of those seen were isolated units. They were, as a rule, free in the liquor sanguinis; one leucocyte was found which had ingested a diplococcus. The individual cocci were of small size, measuring barely one μ in diameter.

CULTIVATION EXPERIMENTS.—It was impossible to take blood in sufficient quantity from the patient to make direct inoculation with it into animals a promising proceeding. It was accordingly decided to attempt to establish artificial cultivations, by inoculating artificial nutrient media with small doses of the patient's blood. The patient's finger was pricked with a sterile needle, after a thorough preliminary cleansing of the part with soap and water, corrosive sublimate solution (1 : 1000), and absolute alcohol, applied in that sequence. From the centre of the drop of blood which exuded, a trace was removed on the tips of a series of sterilized platinum wires, by which the following media were inoculated: Koch's jelly, agar-agar solution, inspissated serum (hydrocele fluid solidified), and sterile potatoes. The three last-named media were incubated for eight days at blood heat for four hours each day. No reaction occurred in any of these media: they remained perfectly sterile.

INOCULATION EXPERIMENTS.—The autopsy of the case just described was held eight hours after death. A sterile Pravaz syringe was filled with fluid blood from the innominate vein, before that vein was in any other way interfered with. A portion of the vegetation found on the cardiac valve was transferred, with aseptic precautions, to a sterile flask; and these materials were taken to the University for experimental purposes. On the same day another case (J. Sweeny) of ulcerative endocarditis was examined in the post-mortem theatre; a portion of the vegetation on the aortic valves in this case was also removed and employed along with the previously mentioned material in the experiments of this series as follows:

EXPERIMENT 1.—Needle of syringe introduced into a large vein of rabbit's ear; and 12 minims of the blood injected slowly into circulation; a single drop of blood was introduced similarly into the subcutaneous tissue of the neck of the same animal (large white rabbit).

EXPERIMENT 2.—Large vein of black rabbit's ear laid bare by small valve-like incision through the skin; vein then opened by carefully

planned longitudinal incision, into which portions of vegetation from the valve of the heart were at once inserted. More of the same material was introduced under the skin into the wound. The wound was then closed; very slight hemorrhage occurred beneath the skin, where it had been detached, and formed with the material introduced into the wound a hard clot.

EXPERIMENT 3.—Small pocket made in skin of brown rabbit's ear, and a portion of vegetation from aortic valve of heart introduced below the skin.

RESULT.—The three animals remained entirely unaffected, and continued perfectly well for several weeks, during which period they were kept under observation. In the animal employed in Experiment 2 the clot formed at the time of the experiment was subsequently absorbed, and the vein operated on remained patent—a slight scar at the site of the wound was the only evidence of its having been made.

CONCLUSIONS.—The experiments of this series were intended to supplement those of Series 1. In this case an organism present in the disease was with certainty, in all three experiments, introduced under varied conditions into an animal. The organisms had been demonstrated during life in the blood in the one case, and *post mortem* in the vegetation in both cases. The conditions were varied in each of the three experiments. In Experiment 1 a considerable amount (twelve minims) of blood containing an organism was introduced into the circulation of the animal, and lest the foreign particles should be at once devitalized by the healthy blood of the animal, a local focus for morbid action was provided by introducing some of the morbid blood into the subcutaneous tissues of the neck. In Experiment 2 the organisms demonstrated in the vegetation were given access both to the blood stream and to the surrounding tissues, the latter in this case depressed by the operation performed. In Experiment 3 a condition was established similar to that induced in the secondary part of the preceding experiment.

In all three the results are negative, not, however, definitely so as regards the pathogenic power of the organism employed, nor as regards the susceptibility of the animal acted upon. The legal difficulty already referred to here presented itself, in the small number of species at command for experimental purposes. One further measure commended itself for trial even in these unsatisfactory conditions, viz., the employment of very large doses of the morbid material. This was carried out in the last series of experiments.

Third Series (June, 1885).

Inoculation experiments only were here performed, the morbid matter introduced being obtained from a well-marked case of ulcerative endocarditis (A. Blythe), in which the organisms were abundantly present in the vegetation. In this case the *post-mortem* examination was made twenty-four hours after death, the body showed no evidence of putre-

faction. A mass of the vegetation was removed with aseptic precautions, mixed with 3j of distilled water, and rubbed down into an emulsion. A rabbit (brown) was placed under the influence of ether, and its left jugular vein laid bare by an incision two inches long. The needle of a hypodermatic syringe was pushed through the wall of the vein into its lumen, and twenty minims of the emulsion of vegetation injected into the blood stream. The needle was then withdrawn and some of the emulsion deposited in the wound, along with flaky portions of the vegetation; the wound was closed by drawing the parts together, but no sutures were employed. The day after the operation the wound was covered by a dry scab. The animal showed then and subsequently no symptom of ill health.

GENERAL CONCLUSIONS.—No definite result has been attained by these three series of experiments. Some opinions may be based upon them, of which the most important is, that the “much-experimented-on-rabbit” is not susceptible to human ulcerative endocarditis. Had positive results accrued to the methods employed in Series 2 and 3, the method of Series 1 would have been subsequently introduced, in order that by cultivation experiments a distinct *materies morbi* might be separated. The method of Series 1, which may be termed the *mediate* method of investigation, can only in the mean time give results of special interest to the germiculturist, until the *immediate* method of investigation, by direct inoculation of morbid products, has demonstrated some species of animal in which the disease may be experimentally produced.

NOTE BY MR. HARE.—Since the above described experiments were performed, some important experimental work upon the subject has been published, to which it will be well to refer shortly. During last year, Wyssokovitsch,¹ working in the laboratory of Professor Orth, undertook an experimental research with a view to producing ulcerative endocarditis artificially in the lower animals. He made use of rabbits in carrying out these experiments, employing pure cultivations of the micrococci obtained from pus in acute inflammatory conditions as a *materies morbi*. A fine probe was introduced into the carotid artery and passed down to the commencement of the aorta, so as to cause abrasion of the aortic valves. When the valves had been in this way prepared for the supervention of morbid processes, a considerable quantity of the infective material was thrown into the blood stream, and the animal soon exhibited all the symptoms of ulcerative endocarditis, and upon post-mortem examination presented the typical appearances of that disease. By simple injection, without injury of the valves, Wyssokovitsch failed to produce the disease. It was found that when

¹ Centralblatt f. d. med. Wissenschaften, 1885, No. 33.

produced artificially, the disease was in the first place strictly limited to the irritated area, spreading not by extension of superficial ulceration but by a destructive process which disintegrated the subjacent tissues. Shortly after the publication of these results the question was taken up by Professor Ribbert, of Bonn, who has now published the results of further experiments.¹ Making use of the *staphylococcus aureus*² in pure cultivations, he injected very large quantities of the infective material into the blood stream of rabbits, without in any way causing previous injury of the cardiac valves. By this means he produces an infective myocarditis in all cases; and in cases where very large doses of the infective material are employed, endocarditis is present in addition to the numerous points of suppurative action found in the muscular structure. Vegetations are produced on both sides of the heart, the mitral valve being usually more affected than the tricuspid, whilst the aortic and pulmonary valves are unaffected. If small doses of the infective material be introduced, the animal still dies of a pyæmic condition, but the disease is not so rapidly fatal as in the ulcerative cases. Where ulcerative endocarditis is present, death usually takes place in from twenty to twenty-four hours; where it is not present, the animal may not succumb till the fifth day.

It comes to be a question how far this experimental pyæmia really coincides with ulcerative endocarditis in the human subject. In their most violent forms the two conditions would appear to be very closely related—*i. e.*, where miliary abscesses and valvular lesions are both present.

Whether the experimental infection corresponds to the less rapid cases of ulcerative endocarditis in the human subject in which pyæmic conditions are absent, must be determined by future investigation. It would appear that there is a close parallelism in certain cases between the action of the pus-producing organism when thrown into the circulation, and that of the special (and, as yet, not fully described) organism associated with ulcerative endocarditis; but this parallelism has not as yet been shown to extend over a sufficiently wide series of cases to establish their identity.

¹ Fortschritte d. Medicin, Jan. 1886.

² Rosenbach, microorganismen bei den Wund-infections-krankheiten des Menschen, 1884.

SCARLATINAL NEPHRITIS.¹

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SCARLET fever derives most of its dangers from disorders that complicate or succeed it. Of these, the most important are derangements of the kidneys. Indeed, a number of recent writers assert that these organs are constantly affected in scarlet fever. Eisenschitz declares that renal catarrh is just as much a feature of scarlet fever as bronchial catarrh is of measles. Frerichs, Reinhardt, Begbie, Newbigging, Holder, and others, maintain the same opinion. The three last-mentioned authors found albuminuria in their cases of scarlet fever without exception (Gee). Böning, who likewise regards renal derangement as constant, found it only to a slight degree in most of his cases, but often, also, encountered diffuse croupous nephritis, which, however, only seldom passed into chronic parenchymatous nephritis.²

Future research may show that simple renal catarrh accompanies all cases of scarlatina, but it is certainly not true that renal alterations competent to excite albuminuria or to reveal themselves *post mortem* to reasonably careful inspection, are invariably present. Thomas practised microscopic examinations in twenty-five of eighty patients, and in twenty of these daily. In the prodromal and eruptive stages he found albuminuria only rarely, and then it was transitory and very slight. Signs of a decided alteration in the urinary tract were most uncommon—symptoms of mild catarrh were more often seen. Only the more severe forms were considered by Thomas to depend upon a specific scarlatinal influence.³ Pathological anatomy would seem to bear out such conclusions, for although Steiner states that evidences of kidney disorder are always present in those who die of scarlatina, whether signs of it were present during life or not, Friedländer, who examined the bodies of 229 scarlet fever cases, after death, found kidney disorder in a little less than one-half. Moreover, it must be admitted that fatal cases of scarlatina are vastly more apt to present renal disorder than those which recover.

Renal catarrh, however, is much more frequently an accompaniment of scarlatina than is generally supposed. It usually escapes observation, as it is only exceptionally revealed by symptoms and can only be recognized after microscopic examination of the urine, a procedure too

¹ Read before the Clinical Society of Maryland.

² In a paper read before the Royal Medical and Chirurgical Society, a synopsis of which appeared in the *Lancet* (Nov. 14, 1885), Dr. Stevenson Thomson, after examination of the urine of 180 cases of scarlet fever, favored the view that nephritis is a feature of scarlet fever almost as essential as the rash or sore throat.

³ Jahrb. f. Kinderheilk., 1870, i.

often neglected, but of the greatest importance as often anticipating dangerous processes that may be averted by timely treatment. Thomas, in denying that this condition is at all constant, shows that it also occurs in measles, croupous pneumonia, intestinal catarrh, etc., and is often but an expression of the febrile condition. At the same time, the catarrh is relatively so frequent in scarlatina that he cannot avoid the conclusion that the specific influence of the disease is often concerned in its production, especially as there is frequently a disproportion between the degree of fever and the signs of renal irritation. Careful observation will detect in many cases from the very beginning, heaped-up masses of renal epithelium, like cylinders, some more or less degenerated or changed into detritus. In milder cases the urine will contain long, flattened mucous casts with increased quantity of mucus, but no albumen. In severe cases the urinary sediment will show more hyaline casts studded with epithelium and epithelial débris, and red and white blood-corpuscles. Slight albuminuria will also be present. This catarrh is for the most part insignificant, and probably only rarely serves as the starting-point for the graver, pronounced, and characteristic forms of nephritis scarlatinosa, though, without doubt, many milder forms of scarlatinal nephritis and dropsy originate in it. Böning and others have observed it pass into croupous parenchymatous nephritis. Thomas concluded that those cases in which nephritis develops suddenly and not from preceding renal catarrh, usually end fatally.

Inflammation of the kidneys sufficiently pronounced to excite albuminuria varies greatly in the relative frequency of its occurrence. In some epidemics it appears in as many as 70 per cent. of cases, while in others not more than 5 per cent. may be attacked. Dickinson, in quoting Hillier's observation that at the Children's Hospital about half of the cases of scarlatina had albuminuria, considered the statement as rather below than above the truth.¹ Fleischmann, at St. Joseph's Hospital in Vienna, noted 95 cases of Bright's disease in 472 observations. During 1861, every third child with scarlatina had dropsy; while during 1862, it developed in only one in ten.² Thomas asserts that renal alterations develop in about one-half of all cases of scarlet fever; while, as has been already shown, there are those who assert that they are present in every case. On the other hand, Jaccoud declares that for fifteen years he has never had a case of scarlatinal nephritis among his scarlet fever patients, a result that he attributes to his treatment.³ Albuminuria may appear at any time during the attack of scarlatina from the very first day, though its most common occurrence is during the second and third weeks. Obviously, dropsy should not be taken as marking the begin-

¹ Albuminuria, page 320.

² Jahrb. f. Kinderheilk., 1870, 411.

³ Gazette des Hôpitaux, 58, 1885, 418.

ning of nephritis, the signs of which may be present in the urine for hours, even days, before this occurs. Fleischmann noted the appearance of dropsy in his cases, 9 times during the first week, 30 times during the second week, 23 times during the third week, 20 times during the fourth week, and 5 times after the fourth week. Of 60 cases at the Children's Hospital, 42 began between the end of the first and the end of the fourth week, while 5 became dropsical during the first week.

When nephritis occurs during the first week of scarlatina, it often escapes attention at the beginning, on account of the blending of its symptoms with those of the essential disease and of the neglect of the attendant to examine the urine. Dropsy will, of course, attract notice, but this does not often occur so early, and may be confounded with the œdema due to the exanthem. Rarely, the fatal issue of what was, apparently, malignant scarlet fever, really may have resulted from a uræmic poisoning due to a fulminating nephritis. In either case the symptoms may have been identical. Fever, vomiting, headache, delirium, amblyopia, coma, convulsions, may have been present. The convulsions are often very irregular. They may be general, partial or unilateral, tonic or clonic. The patient may have several in rapid succession, or may pass into a status epilepticus from which only death will release him. In nephritis of this character the urine will be completely or partially suppressed. That secreted will be of high specific gravity (1.020 to 1.040), dark and smoky in appearance, loaded with albumen, and depositing an abundant sediment of hyaline, epithelial, granular, and blood-tube-casts, with renal epithelium and red and white blood-corpuscles in greater or less quantity.

According to Glax¹ and others, the very diminution, to great extent, of the urine, during scarlatina, is ominous, as indicating renal complications, and death has been known to follow before albuminuria was established. If the kidneys become implicated toward the end of the first week, the development of symptoms may delay the course of what may otherwise appear to be a normal case of scarlet fever. Microscopical research will often betray the onset of the changes in advance of chemical analysis; casts of the renal tubules will be observed, along with epithelial deposits and detritus, before albuminuria is developed. This, however, will shortly appear, and in severe cases the scarlatinous symptoms will be interrupted by those of the nephritis. There will be no constant relation between the amount of albumen, the tube-casts, and the general detritus—one variety of sedimentary matter being at one time copious, at another very scanty. At this time vomiting may begin with returning headache, the appetite may again fail, pain in the loins may become annoying; the patient may again become depressed and feeble,

¹ Deutsche Archiv f. klin. Med., 33, 1883.

and his fever may cease to diminish—may even exceed its original intensity. At other times no apparent influence will be exerted upon the scarlatina, which will run its usual favorable course until the occurrence of dropsy and albuminuria reveals the implication of the kidneys.

When the renal disorder develops after defervescence, during the second, third, or fourth week, or later, the same series of symptoms may be observed, their severity being generally in direct ratio to the earliness of their occurrence. Thomas thinks that cases developing after the fourth week may be expected to run a favorable course. It has been asserted that the renal disorder may arise after several months; but if a patient pass the sixth week in safety, he will almost certainly escape. The symptoms, in cases arising during these weeks are not always gradually developed, and some of the most disastrous results of the disease may be encountered during the second, third, or fourth weeks in children apparently convalescing from scarlatina, and often in full desquamation, who, after a few hours' indisposition with nausea, headache, malaise, confusion of ideas, or stupor, with return of fever, rapidly pass into coma or convulsions ending after a short interval in death, before dropsy has developed and after partial or complete suppression of urine.

It is the rule for scarlatinal nephritis to pursue a mild and favorable course. Dropsy is usually the first symptom observed, first appearing in the face, and sometimes remaining confined to that locality; at other times becoming speedily general, and giving an appearance of plumpness, but with a waxy translucency of skin. The face, upper and lower extremities, body wall, and prepuce may thus become dropsical. The serous cavities are very often implicated, and more or less filling of the pericardial, pleural,¹ peritoneal, scrotal, and intracranial cavities occurs. Œdema of the lungs and of the glottis not very infrequently imperils life. Desquamation is often completely arrested upon the supervention of dropsy. The temperature, which in the more severe cases may be much elevated, is more commonly but little above normal, not exceeding 101° or 102° F. The pulse, sometimes accelerated and feeble, will often become remarkably slow and intermittent, and so remain throughout the attack. The child will grow dull and listless, and exceedingly feeble. Pain in the belly and in the back will at times prove very annoying, or, again, may be absent. The tongue, having lost the strawberry aspect of the stage of eruption, will become pale, flabby, and coated, the appetite will fail, and the bowels become sluggish. The urine will rapidly diminish in quantity, and may deposit urates copiously, or may present a smoky and oily appearance, due to the abundant presence of epithelial cells, white and red blood-corpuscles, and tube-casts. The total amount may

¹ The hydrothorax is sometimes unilateral.

now be reduced to a few ounces. Blood corpuscles are often very abundant, and form a thick red layer at the bottom of the test-tube. This free admixture of blood may at times amount to very well-marked hæmaturia. Such hæmaturia is generally post-scarlatinal, and, according to Schütz, occurs during the third or fourth week most frequently. Ordinarily, of itself, it adds but little to the gravity of the case. The patient often feels fairly well, and may eat and sleep with comfort. While the œdema and pallor may be very great, the temperature, and pulse may vary but little from the normal, or may show the changes of ordinary scarlatinal nephritis. With the gradual improvement of all the symptoms, the hæmaturia disappears. Heubner¹ has reported a case of nephritis after scarlatina in which hæmoglobinuria was present. The urine became brownish-black; no blood corpuscles were present. Death resulted from asthenia on the fifth day after both albumen and hæmoglobin had disappeared from the urine.

The amount of albumen in the urine in scarlatinal nephritis is usually very great. The urinary sediment is also abundant, and is largely composed of tube-casts. Hyaline casts predominate; though finely and coarsely granular, and epithelial casts are numerous; later, coarse fatty granules stud the casts plentifully. The casts are often almost diffuent, and differ strikingly from the firm and sharply outlined casts of more chronic nephritis. They are sometimes of enormous size, coming from the larger tubules. Crystalline deposits are scanty, and are mostly confined to uric acid and urates. On the other hand, the amorphous urates are often very abundant. The extent of the albuminuria present is of less importance than the total quantity of urine, rapid and extensive diminution of this being most ominous as indicating the accumulation of nitrogenous waste in the blood and danger of resulting uræmia. Glax² has been able to draw important conclusions from the amount of urinary water in scarlatina. He recognizes three types, after which the urine is secreted: 1. The total urine is only lessened so long as the fever continues, after which it gradually increases until the normal amount is reached, or, for a few days, even exceeded. In such cases the course is always favorable, desquamation occurs promptly, and albuminuria is absent. 2. Diuresis increases after the beginning of fever, often very considerably, then during the following days markedly diminishes, and shows notable variations during the attack. In these cases the course is protracted, desquamation imperfect, and the heart's action weak. Anæmia frequently develops, cutaneous œdema not seldom, but the urine remains free from albumen. 3. Micturition, which during the fever was much diminished, quickly returns to the normal with defervescence, and then suddenly again diminishes, and remains

¹ Deutsches Arch. f. klin. Med., xxiii. 288.

² Ibid., xxxiii., 1883.

scanty until death, or after several days polyuria develops, which slowly sinks to normal diuresis. These are the cases in which, after a normal course, nephritis and dropsy occur later. A lessening of the proportion of urine secreted to fluid ingested (2:3) not unfrequently foreshadows the approach of uræmic symptoms, even though the urine contains no albumen.

Whether, throughout the attack, the temperature remain normal or after an initial chill become elevated and all the symptoms of acute nephritis develop, complete recovery may reasonably be expected if the patient pass safely through the earlier phases of the disorder. But although nephritis and dropsy may be slight, albuminuria lasting only a few days and anasarca being limited to mild puffiness about the eyes, scarlatinal nephritis does not usually subside entirely in less than a month. It may endure as long as three, four, or five months, and, rarely, there seems good reason to believe that chronic nephritis in young people may have had its beginning in antecedent scarlatinal inflammation of the kidneys. Such a result, however, is exceedingly uncommon.

The dropsy is indicative of the degree of renal derangement, except in the most acute cases, and sometimes reaches enormous proportions—as the urine increases in quantity the albumen proportionally diminishes and the dropsy disappears; the skin, which until now has been dry and inactive, becomes softer, more elastic, and resumes its proper functions. The appetite improves, the spirits, strength, and mental activity return, and good health gradually becomes restored. Just as the microscope reveals the earliest evidence of renal derangement, so does it continue to expose the results of pathological action after chemical tests fail to do so. Tube-casts continue to appear in the urinary sediment, sometimes for weeks after the cessation of albuminuria, the epithelial, blood, coarsely granular, and fatty casts gradually giving place to finely granular, hyaline, and mucous ones, which, in their turn, finally disappear. When the disorder terminates fatally, the symptoms will be those of acute nephritis: suppression of urine may be followed by signs of cerebral disturbance, headache of violent character, during which blindness occurs very often, with or without dilatation of the pupil, vomiting and convulsions, partial or general, coma, and sometimes paralysis; or the fatal termination may slowly be reached through constantly increasing asthenia; or, what is quite frequent, complications may arise which cannot always definitely be ascribed to the nephritis or to the scarlatina itself. These are inflammations of the pleuræ, the pericardium, the endocardium, the peritoneum, the cerebral meninges, etc. Pneumonia, acute articular rheumatism, or enteritis, may also hasten the fatal issue.

Cases are occasionally observed in which dropsy follows scarlatina,

but without albuminuria. Indeed, a tendency toward non-albuminuric dropsy after scarlatina has been associated with certain epidemics. Scarlatinal dropsy without renal affection has been observed by Guer-sant, Rilliet and Barthez, Noirot, Bouchut, Löschner, Duckworth, and others. Quincke¹ tries to explain such cases of non-albuminuric dropsy as not depending upon nephritis, but as a consequence of the scarlatinous irritation exerting some peculiar influence upon the connective tissue. Such cases probably occur in the experience of most busy practitioners. One should be cautious, however, in deciding against a nephritic origin of these dropsies, except where they can be definitely attributed to anæmia and debility. Hennoch² has asserted that cases of nephritis occur in which albuminuria is absent up to the time of death. He reports a case in which anasarca was present for three weeks after scarlatina, and yet albuminuria and tube-casts were absent until convulsions occurred, with death resulting from œdema of the lungs. In this case, a necropsy revealed the presence of acute nephritis. He also reports the case of a child dead on the thirteenth day, of malignant scarlet fever, in whom repeated tests during life had not shown albuminuria, and yet whose kidneys showed indubitable evidences of hemorrhagic nephritis. Steiner has seen nephritis without dropsy, but never dropsy without nephritis after scarlatina. It is altogether probable, however, that in many cases the dropsy following scarlatina without albuminuria is secondary to concomitant anæmia. This is the view adopted by Hennoch. Whatever be the explanation, such cases usually run no remarkable course. The general health is not much reduced. The urine is in normal amount, the various functions fairly performed. With the disappearance of the dropsy, convalescence generally becomes established.

Scarlatinal nephritis is not associated with any especial type or phase of scarlatina. It is as frequent after mild as after severe attacks; indeed, it is possible that the care exercised over those who have had grave attacks of scarlet fever, as shown in proper nursing and hygienic surroundings, may furnish a safeguard against renal complications. At all events, there is a widespread belief that the milder cases are more apt to be followed by nephritis and dropsy. Violent nephritis may certainly follow a scarlatina so mild as to have escaped observation; but individual predisposition and epidemic type are probably the most important etiological factors, though at present not enough is known to justify dogmatic statement.

Scarlatinal nephritis and dropsy may occur without antecedent symptoms of scarlatina. Instances of this are not uncommon, though the evidence that supports them is rather circumstantial than direct. Several members of a family, or of a school or asylum in which scarla-

¹ Berl. klin. Wochensch., 27, 1882.

² Ibid., 50, 1873.

tina has been known to prevail, may exhibit the dropsy and albuminuria characteristic of scarlet fever, in whom no previous symptom of the disease had been manifested. Such cases run an ordinary course, but may at times develop a severity altogether unexpected.

PATHOLOGICAL ANATOMY.—The kidneys of those who die of scarlatina, or of the nephritis consequent upon it, present morbid conditions, the often widely differing characters of which depend upon the nature and intensity of their exciting causes. Friedländer,¹ in his investigations, found three forms of renal inflammation after scarlatina, which are sharply defined from each other. These are, 1. Initial catarrhal nephritis, the early form; 2. The big, flabby, hemorrhagic kidney, interstitial septic nephritis; 3. Glomerulo-nephritis, nephritis post-scarlatinosa. The first, he asserts, appears with the beginning of the exanthema, or a few days later, and disappears in a few days or weeks. It rarely excites œdema, and hardly ever kills. It is analogous to the alterations productive of the febrile albuminuria of many infectious diseases. The kidneys show cloudiness, swelling and proliferation of the tubular epithelium, and later, fatty degeneration. In the tubular lumen are hyaline and granular cylinders, round cells, and desquamated epithelium. In the interstitial tissue are scattered round cells. The capsule of Bowman is thickened, and at times there is a small amount of albuminous fluid between the capsule and the glomerulus. Micrococci are sometimes found in the capillaries and tubules. The large, flabby, hemorrhagic kidney was found in 12 of the 229 scarlatinal necropsies made by Friedländer. It was found especially when the scarlatina had been complicated by severe diphtheria, abscess, etc. It is not characteristic of scarlatina, but is also seen in primary idiopathic diphtheria. The kidneys are large and soft, and show pronounced cortical changes. The cortex is invaded by small extravasations and larger blood infiltrations. The epithelium is only slightly altered, but the interstitial tissue is thickened and abundantly infiltrated with round cells. Emboli of micrococci are commonly present. The disorder develops between the first and fourth weeks, and is so rapidly fatal that œdema has not time to develop. It is an especially severe form of septic nephritis.

Glomerulo-nephritis, Friedländer holds to be the only characteristic scarlatinal nephritis. The kidneys in this condition are firm, often hyperæmic, and resemble the cyanotic kidney, except that the glomeruli do not appear red upon section, but gray and anæmic. They are enlarged and prominent. Alterations are almost limited to the glomeruli, which are enlarged by one-half. Their nuclei are enlarged, their coils empty of blood, their walls thickened, and their lumina contracted or obliterated. Bowman's capsule is only slightly thickened, as a rule; some-

¹ Fortschritte d. Med, No. 3, 1883, p. 81.

times it is proliferated. Accompanying conditions are slight interstitial cell infiltration, fatty degeneration of epithelial cells, and hyaline formation in the arteries. The alterations in the glomeruli easily account for the anuria and uræmia, as well as rapid hypertrophy of the left ventricle, by their obstruction of the renal arteries, as nearly all of the renal arterial blood has first to pass through the glomeruli. Scarlatinal glomerulo-nephritis was first described by Klebs.¹

Klein,² who has given the subject especial attention, in a series of 23 necropsies of bodies of those dead of scarlet fever, did not observe the identical glomerulo-nephritis as described by Klebs. Klein's cases died at various periods between 2 and 44 days. Their ages were between 2 and 36 years, the largest number being between 2 and 12 years old. Klein's observations included changes resembling the glomerulo-nephritis of Klebs, but these were only characteristic of the early stages of scarlatina. He divides the changes into those occurring in the early and those occurring in the late stages, a definite boundary between them not being present. The first set of changes are chiefly limited to the cortex. They are, 1. Increase of nuclei (probably epithelial) covering the glomeruli. 2. Hyaline degeneration of the elastic intima of minute arteries, especially of the afferent arterioles of the Malpighian tufts. The intima of these vessels is swollen from place to place into spindle-shaped hyaline masses, causing narrowing of the lumen. There is similar hyaline degeneration of the capillaries of the glomeruli, causing these often to become impermeable. These degenerated parts become more fibrous in appearance and Bowman's capsule becomes thickened. 3. A third change is multiplication of the nuclei of the muscularis of the minute arteries with increased thickness of their walls. This is most conspicuous at the entrance into glomeruli, but is also distinct in other arteries of the cortex and in the base of the pyramids. There are, also, swelling of the epithelia of the convoluted tubules and proliferation of their nuclei, especially of the tubules close to the afferent arterioles of the glomeruli. Granular matter and blood may be found in the cavity of Bowman's capsule and in the convoluted tubules. In some cases there is detachment of the epithelium of the large tubules of the pyramids.

Klein's observations, 1, that the hyaline changes readily affect the arteries near their point of branching, and, 2, that the hyaline substance is of the nature of elastic tissue, agree with the conclusions of Neilson concerning the arteries in various cerebral disorders and in many infectious diseases. He does not think that the anuria and uræmic poisoning in scarlatina, when the kidney does not show conspicuous change, are due to compression of the vessels of the glomerulus

¹ Handbuch der Path. Anat.

² Transact. Path. Soc. London, 1877, xxviii. p. 435.

by the nuclear germination, as claimed by Klebs. He rather attributes these to the changed state of the arterioles, and suggests that the increased exercise of the arterial muscular tissue under the influence of the stimulus supplied by the disease, may cause a contractility which affects the calibre of the arterioles and shuts out the glomerulus from the circulation, and thus, so far as it operates, suppresses the secretion of urine. This hyaline change is seen in other arteries and in other diseases. The parenchymatous changes found in the early stages are slight and in some cases difficult to detect, the cloudy swelling and granular degeneration being limited to small portions of convoluted tubules. The second order of changes occurred in cases beginning about the ninth or tenth day. They were interstitial as well as parenchymatous. Round cells were found in the connective tissue of the kidneys around the large vascular trunks, spreading thence into the base of the pyramids and into the cortex. Klein declares that this begins about the end of the first week and gradually increases until portions of the cortex, very seldom portions of the bases of the pyramids, are converted into pale, firm, round cell tissue, in which the original tubes of the cortex become gradually squeezed and lost. The parenchymatous element of the nephritis consists in crowding of urinary tubules with lymphoid cells, granular and fatty degeneration of the epithelium of the tubules, and various kinds of cylinders. This becomes distinct as the interstitial changes become pronounced. The infiltration of the cortex with round cells begins at the roots of the interlobular vessels, spreading rapidly toward the capsule of the kidney, and laterally among the convoluted tubules around the glomeruli. At first between the medullary rays, it later encroaches upon them and also the subcapsular region. Parts of the cortex may thus be converted into whitish, firm, bloodless, cellular masses in which Malpighian tufts and urinary tubules become more or less degenerated. In one case renal embolism was encountered; the interstitial inflammation was very intense, as also the parenchymatous inflammation. The kidney was markedly enlarged. The intensity of the parenchymatous inflammation is dependent upon the degree of the interstitial nephritis. Klein also notes the deposition of lime in the epithelium and lumina of the tubules, first of the cortex and then of the pyramids, at an early stage of scarlatina when only slight changes are otherwise shown. Cases of scarlatina, according to Klein, that die after the ninth or tenth day, usually show more or less well-marked interstitial nephritis.

TREATMENT.—Though nephritis may arise both in mild and in severe cases of scarlatina, in cases where exposure is known to have occurred and in those who have been jealously protected from injurious influences, there can be no doubt that sudden changes of temperature, strong draughts, dampness, etc., are powerful predisposing causes of kidney

disease after scarlatina. Mahomed declared that a slight chill during convalescence is sufficient to cause transitory albuminuria. The patient should, therefore, be carefully protected. During the height of the disease the daily bath or tepid sponging should be continued, a procedure through which renal complications are frequently avoided. Even the mildest case should be kept in bed for at least a week after the cessation of fever; nor should he be permitted to leave his room before the expiration of the third week. Out-of-door exercise should not be resumed in disregard of states of season, of barometric and of thermometric variations.

In midsummer, when windows and doors must remain open, the question of outdoor exercise becomes one of danger rather to others than of personal risk; while in spring, fall, and winter the risks of exposure are especially great, and in midwinter the patient should not venture out before the sixth or seventh week after perfectly normal scarlatina. During convalescence, daily warm or tepid baths should be continued until the completion of desquamation. Slight albuminuria may occur, according to Mahomed, during convalescence, associated with constipation and a hard pulse, indicative of high arterial tension, without subjective symptoms, and remediable by a brisk purge, the renal functions being quickly restored.

Dietary management will go far toward preventing renal complications. The observance of a rigid milk diet in all cases of scarlatina is regarded by Jaccoud as absolutely preventive of nephritis in scarlet fever. Though this may not be a justifiable opinion, it is certain that in this disease there is no better diet than one of milk. Should nephritis arise, it is the more important that the milk diet should be continued. From two to three or four pints may be given in small quantities at brief intervals, during the twenty-four hours, the largest amount mentioned being sufficient for an adult without other food. If there are reasons why milk cannot be given, light broths and soups are more suitable than beef tea and may be administered with wholesome farinaceous food. Buttermilk may at times be preferred, and bonny-clabber and slip or junket (milk sweetened and flavored and coagulated with liquid rennet), are often relished and are excellent articles of food.

When nephritis forms a feature of rapidly fatal malignant scarlatina, it may have no time to develop symptoms, or these may escape observation, or the virulence of the disease may have thrown the renal disorder into the background or have rendered attempts to treat it futile. In milder cases, and later, during the latter part of the first or during the second or third week, when nephritis occurs, special attention may be devoted to its treatment.

Proper regard having been paid to the patient's hygienic surroundings and nutrition, a brisk hydragogue cathartic should be administered,

if, as is usual, there is a tendency toward constipation. For this purpose nothing is better than the compound jalap powder. For a child, from five to twenty grains of this should be ordered every second night or every night, as required, the object being to secure several watery actions of the bowels every twenty-four hours. The proper dose for an adult is one drachm. The desired watery stools will be most readily obtained by the saline cathartics when given in concentrated watery solution, as has been definitely shown by the researches of Dr. Matthew Hay. The more drastic purgatives will rarely be required except in uræmic intoxication and in extreme dropsy, when podophyllin, croton oil, elaterin, etc., may occasionally be employed with benefit. When dropsy is but slightly pronounced, purgation may not be required.

The proper action of the bowels being provided for, the establishment of diaphoresis and healthy skin action will demand attention. Frequently during the day the body may be wrapped in flannels, wet or dry, as hot as can be borne, or the pack may be applied. When available, the steam bath or hot-air bath is to be strongly recommended. Excellent results may also be secured from the hot plunge-bath. Pilz has especially lauded this treatment. It should be used after the method of Liebermeister, by gradually increasing the temperature of the bath from 36° C. to 40° C. (96°–104° F), in a half hour. Under its use the dropsy rapidly disappears. Diseases of the heart or lungs, while not positively contraindicating this plan of treatment, necessitate great caution in its application. Every precaution against sudden chilling of the surface must be observed.

The kidneys demand the greatest consideration. The imminence of danger is usually proportionate to the impairment of their function. In giving remedies directly to modify the action of the kidneys, none calculated to increase their hyperæmia should be employed. On this account, the stimulating diuretics should be avoided. Exception can hardly be made in favor of juniper, which enjoys, with some writers, considerable reputation in scarlatinal nephritis; but digitalis, the pharmacological position of which is not as yet definitely determined, has received very general approval as a most useful diuretic in acute nephritis. The infusion is by all odds the best preparation of digitalis when its diuretic properties are desired, and may be given in doses of from one fluid-drachm to a half fluidounce, according to age, three or four times daily. Its effects are, however, hardly as happy as when dropsy is associated with or dependent upon cardiac weakness. Those diuretics that act specifically upon the secreting cells of the urinary tubules, the sedative or refrigerant diuretics, are, as a rule, to be preferred in the treatment of scarlatinal dropsy, and will often effect the most astonishing results. Of these the salts of potash are most efficacious, the citrate, acetate, bitartrate, and bicarbonate. In cases of slight nephritis and anasarca,

a lemonade made with bitartrate of potash will be taken with avidity, and will often almost magically increase the quantity of urine, reduce the dropsy, rapidly diminish the albuminuria, and cause a radical change for the better. This lemonade may be made by adding one drachm of cream of tartar to a pint of boiling water into which a lemon, cut into thin slices, has been dropped. This quantity, properly sweetened, may be drunk during the day by a child five years old. Water may be allowed freely, and any of the mild domestic infusions may be substituted for it, their virtue residing principally in the amount of fluid. Dickinson especially commends the free use of water as unirritating and tending to wash out of the tubules the exudated matters that choke up their lumina.

In more severe cases, where life is threatened through one or another of the various features of uræmia, most energetic treatment will be required. Jaborandi may now prove useful. J. Lewis Smith speaks of it in terms of highest praise, and quotes Hirschfeld's commendation of its action. To a child two years old one-twentieth of a grain of pilocarpin may be given by the mouth every fourth or sixth hour, or the same amount may be injected hypodermatically. Both diuresis and diaphoresis will be promptly increased, and in favorable cases the uræmic symptoms disappear. Uræmic coma and convulsions developing suddenly or only after progressive renal embarrassment, should be treated without reference to the scarlatina and upon general principles. A remedy of most undoubted value, at least for the control of convulsions, is chloral, which, if the patient be unable to swallow, may be injected in full doses under the skin or into the rectum. Under its influence convulsions will often speedily cease.

After the more acute nephritis has subsided and convalescence promises to become established, iron becomes one of our main reliances, both through its hæmatic and diuretic properties. The tincture of the chloride is the most appropriate preparation in some cases, but, in general, the *mistura ferri et ammoniæ acetatis* of the pharmacopœia will produce the best results. Quinine is also a remedy of great value in the treatment of convalescence from scarlatinal nephritis.

During the height of the inflammation, local treatment is often of great importance. If the fever is intense, the pulse full and strong, and if pain and tenderness in the back are pronounced, the abstraction of blood, by leeches or cups, from the loins, will, beyond doubt, often prove beneficial. Large poultices and sinapisms may also often be applied over the kidneys, and besides assuaging the irritation, tend to promote diaphoresis and diuresis. For obvious reasons turpentine should not be employed as a counter-irritant in these cases. Occasionally ascites may be so excessive that the pressure exerted upon the kidneys interferes with the action of therapeutic agents and impedes

the functional activity of these organs. Paracentesis abdominis, by relieving this compression, will often be followed by copious diuresis and the rapid disappearance of general anasarca. Cases of scarlatinal nephritis will, unfortunately, sometimes pass into chronic Bright's disease, and then will require the usual treatment for this condition.

19 CATHEDRAL STREET.

BACTERIOLOGY.

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THE rapid advances of bacteriology during the last few years, and the important *rôle* which bacteria play both in health and disease, render unnecessary any apology for the publication in a journal devoted to the medical sciences of a sketch of the chief facts which have been made out with regard to these microörganisms and of the methods of investigation employed in their study. A knowledge of what has been discovered with regard to these minute bodies is essential for the study of pathology, and for the rational treatment of infective diseases. But it is more especially in the department of preventive medicine that the practical value of these researches is as yet evident. So long as the precise cause of a disease is unknown, the views held as to its origin must necessarily be vague, and the measures adopted against it often either inefficient or excessive. But when the cause is known, and more especially when it can be studied apart from the body, its life history, its habitat outside the body, its mode of entrance into the system, and the best methods of destroying it under various conditions are learned, and the measures to be adopted against it can be made precise and effectual. It is not, however, sufficient for the medical officer of health to know the literature of the subject; he must himself be a bacteriologist, ready and able at any moment to carry out an investigation on bacteria. More especially must he be acquainted with the methods of demonstrating, recognizing, and studying these organisms in water, food, etc., with the view of determining in many cases whether these substances are hurtful or not, and also with the view of ascertaining the exact source and commencement of any given epidemic. The importance of this knowledge is self-evident, and I need not do more than point out one striking example of the value of being able to ascertain the earliest cases of an epidemic disease. The diagnosis, clinically or by post-mortem examination, of an isolated case of Asiatic cholera has, up till recently, been very difficult, or almost impossible; it is, as a rule, only after the epidemic is

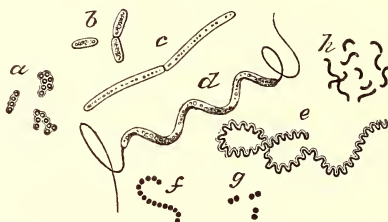
established that the nature of the disease is known. But it is admitted on all sides that, if the first case be recognized, measures can be taken which may prevent the spread of the disease, provided that contamination of some common source of food or water supply has not been the cause of this first case—in other words, provided that the first infection has come from without, and not from some source common to the other inhabitants of the place. Now, by the use of the recent methods of cultivation, the diagnosis can be readily made by ascertaining the presence or absence of Koch's cholera bacilli in the dejecta of the patient. A grave responsibility rests on every sanitary officer who does not know how to demonstrate and recognize these organisms. In fact, I consider that every candidate for a qualification in sanitary science should be required to show a practical knowledge of the recent methods of research, as well as a thorough acquaintance with the literature of the subject. It is necessary that the practising physician also should be, to a certain extent, versed in some of the methods, more especially in those of staining and examining bacteria, as, for example, the bacillus of tubercle, in order to enable him to make or confirm his diagnosis. In surgical work, again, more especially in the treatment of wounds, a practical acquaintance with the subject is almost essential. Whatever antiseptic substance be employed, or whatever method of wound treatment be adopted, the principles enunciated years ago by Sir Joseph Lister must be rigidly adhered to: microorganisms must be completely excluded from wounds or their active development must be prevented. To do this intelligently, the surgeon must know what are the chief facts with regard to bacteria; while, to carry out wound treatment comfortably and successfully, a practical knowledge of the methods employed in laboratory researches is almost essential. To the surgeon unacquainted practically with these methods, the details of treatment must be irksome, and consequently often imperfectly carried out; while to him who has worked with these organisms in the more difficult laboratory experiments, the manipulations necessary in surgical treatment become almost instinctive. The importance of these studies will doubtless become more fully recognized as time goes on, and facilities for their study by students will be provided in every good teaching school, as is, indeed, being already rapidly done in the leading universities in Germany.

The bacteria belong to the lowest forms of life, and for a long time were included in the animal kingdom. The study, however, of their morphological and physiological characters, their modes of reproduction, and the close relations which they evidently bear to the algæ (to certain of the phytochromaceæ more especially) on the one hand, and to the lower fungi on the other, have led observers to look on them as the lowest stage of plant life.

They consist of single cells, which may remain isolated or become

united together in rows or groups. The cells may be of various shapes and sizes, but there are three chief morphological types which have led to the provisional subdivision of the bacteria into three great classes. In some bacteria the individual cells are round or slightly oval; these are termed cocci (Fig. 1, *a, f, g*), and are subdivided into micrococci

FIG. 1.



- a, f, g.* Micrococci. *a*, staphylococci; *f*, streptococci; *g*, diplococci.
b. Short bacilli (bacteria, Cohn).
c. Long bacilli (vibrio).
d. Spirillum.
e. Spirochaeta.
h. Comma-bacilli (intermediate between bacillus and spirillum).

and megacocci, or according to their arrangement into staphylococci (Fig. 1, *a*), streptococci (Fig. 1, *f*), ascococci (Fig. 3, *d*), etc. The term micrococcus is, however, generally applied to the whole group. Again, the cells may be more or less elongated, varying from short rods which are twice as long as broad, to long threads; these are the bacilli (Fig. 1, *b, c*). This second class was divided by Cohn into two: the bacteria proper, where the cells are small and short, and do not form chains or threads (Fig. 1, *b*), and the thread bacteria, where the individual cells are longer and remain connected together so as to form chains and threads, these being again subdivided into the bacilli, where the threads are straight, and the vibriones, where the threads are wavy (Fig. 1, *c*). This subdivision has not, however, been found to be practicable, for under some circumstances a rod may be so short as to deserve the name bacterium, while under other conditions it may become so much longer as to require the term bacillus. Hence it is best to include both of Cohn's divisions in the one class, bacillus. In the third class the organisms are elongated and twisted like a corkscrew. These are termed by Cohn, spiro-bacteria (Fig. 1, *d*), and by him are subdivided into two forms—the spirochaetæ (Fig. 1, *e*), where the rod is flexile and long, and the turns of the screw close together; and the spirilla proper (Fig. 1, *d*), where the rod is stiff, shorter, and the turns of the screw wider apart. The whole class of spiro-bacteria is now generally spoken of as spirilla. As intermediate or transitional forms between bacillus and spirillum, we may reckon the various comma-shaped organisms found by Koch, Finckler, Deneke, etc. (Fig. 1, *h*), and also the organisms formerly called

vibriones. The various classifications of the bacteria will be considered afterward, for the present we will speak generally of the three groups which have been referred to, the micrococci, the bacilli, and the spirilla.

These cells consist of a mass of protoplasm in which as yet no nuclei have been discovered enclosed in a cell wall, and sometimes surrounded by a gelatinous material or capsule.

The protoplasm in the smaller bacteria appears to be homogeneous, but in several of the larger forms, in the spirilla especially, it is finely granular, while in some it contains coloring matter, starch, and fat granules, etc., as will be mentioned immediately. It may be arranged equally throughout the cell, or it may be collected in masses at various parts of the interior; at any rate, the latter appearance is often presented after staining. In the micrococci the protoplasm of the coccus is apparently homogeneous throughout, but in many bacilli, on the other hand, it presents a beaded appearance. This is especially well seen in stained specimens of the tubercle bacillus where from four to eight of these beads are generally present in one rod, each bead being connected by a narrow line of deeply stained protoplasm. By suitable illumination of the specimens, the same beaded appearance can be demonstrated in a number of bacilli. Its occurrence may be due to some extent to the action of the reagents employed; but I think that, on the whole, it must be held to indicate a certain differentiation in the structure of the cells. It may indicate either the accumulation of the protoplasm at various parts of the rod, leaving only a small quantity in the intervening portions, or a different chemical composition of the protoplasm in different places. Possibly, in some cases the first, in others, the second explanation is the proper one. Thus in the tubercle bacillus (Fig. 2, *a*), and in several other bacilli, the cell wall forms a continuous tube of equal

FIG. 2.



a. Tubercle bacilli.
b. Cholera bacilli.

calibre containing the beaded protoplasm: here, probably, the second view would apply. In other cases the cell wall seems to be pinched in on each side of the beads, indicating the presence of a smaller amount of protoplasm at these places (Fig. 2, *b*). This appearance must not be confounded with division of the cells, from which it may be readily distinguished, chiefly by the fact that a continuous tube can be seen outside the beads, and also by the fact alluded to that the stained protoplasm is often continuous from one bead to the other, and is not completely interrupted, as is the case where two bacilli join one another. Nor must

the clearer intervals be looked upon as spores, for which they have often been mistaken from the fact that spores do not take on the stain when subjected to the same process as the rods. Spores are round or oval bodies; the clear spaces alluded to here are biconcave.

As to the nature of this protoplasm very little is known, but from its chemical reactions it is evidently closely allied to the protoplasm of other cells. Judging from its reaction with the aniline dyes the protoplasm of most bacteria most nearly approaches in its chemical characteristics that of the nuclei of cells, for the same method of staining with aniline colors which is employed for certain bacteria in tissues, will also stain the nuclei of the tissue cells. On the other hand, it is not identical with nuclear protoplasm, for other substances which will stain the nuclei of cells will not stain bacteria. Again, the protoplasm of different bacteria differs in composition, as shown also by the effect of staining reagents. Thus, methods of staining which will stain anthrax bacilli will not stain the bacilli of tubercle and syphilis—at any rate, not so intensely. The chief researches on the composition of the bacteria have been carried out by Nencki.¹ According to him, the actively growing bacteria contain 83.42 per cent. of water. Of the remainder, 84.2 per cent. consists of an albuminous substance, 6.04 per cent of fat, 4.72 per cent. of ash, and 5.04 of undetermined materials. The albuminous substance is called by Nencki *mycoprotein*, and differs from other proteid substances in its composition. It contains 53.32 per cent. of carbon, 14.75 per cent. of nitrogen, 7.55 per cent. of hydrogen, and probably neither sulphur nor phosphorus. Analysis of other bacteria by Nägeli and Löw gave somewhat different results.

Bacteria have always been considered to be devoid of chlorophyll, but Van Tieghem has described an organism which he reckons among the bacilli, and calls *bacillus virens*, which has a green color due to the presence of this substance.² Some bacteria, when growing in colonies, give rise to masses of various colors. These are called the chromogenous bacteria. It is difficult to say whether the coloring matter in these cases is present in the protoplasm of the cell, in the inner cell membrane, or in the material which unites the cells together. In some large organisms—for instance, in the *beggiatoa rosea-persicina* of Zopf—the pigment is apparently present in the protoplasm of the cells in a dissolved state, but in most cases the cell protoplasm is probably free from pigment. Some bacteria give a reaction of starch. According to Van Tieghem, a form of spirillum (*spirillum amyloferum*), and according to Trécul, the *bacillus amylobacter* (*bacillus butyricus*) contain granules which give the starch reactions. This starch is not only present when the

¹ Nencki, Journal für prakt. Chem., N. F., Bd. 23, and other works. The facts here mentioned are quoted from Flüge, Fermente und Mikroparasiten, 1883.

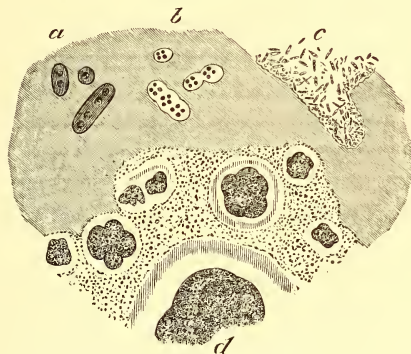
² See De Bary, Vorlesungen über Bacterien, 1885.

organisms are growing in a solution containing starch, but also when starch is absent from the food. This reaction is apparently only present at certain stages of growth of the organisms. The *beggiatoa* which grow in various waters, more especially in sulphur springs, contain at certain periods of their growth granules of sulphur, sometimes of considerable size.

The cell wall can be readily demonstrated by various reagents, and in the case of most bacteria is said to contain a carbohydrate closely allied to cellulose. This is especially the case in the non-putrefactive bacteria, such as the *bacterium aceti*, but Nencki and Schaffer assert with regard to the putrefactive bacteria, that the wall consists of mycoprotein like the contents. This membrane is generally flexible, but in some, especially in the spirilla, it is apparently rigid.

Some bacteria, when single or in pairs, are surrounded by a gelatinous material forming a capsule. This is perhaps best seen in Friedländer's *pneumococcus* (Fig. 3, *a*). In it the cocci occurring singly, in

FIG. 3.



- a*. Pneumococcus with its surrounding capsule.
- b*. Micrococcus tetragenus, with capsules.
- c*. Zoöglæa formed by bacilli.
- d*. Ascoccus, clumps of micrococci embedded in a gelatinous mass.

pairs, or chains of three or four, are surrounded by a broad capsule which takes on the aniline stain faintly. This material swells up and apparently dissolves in water, and hence in pneumonic sputum the capsules cannot be satisfactorily demonstrated. Similar capsules are rare in the case of isolated bacteria, but they have been described in other instances, as in *micrococcus tetragenus* (Fig. 3, *b*), in the bacillus of blue milk, etc. In other cases the bacteria do not remain isolated, each surrounded by its own capsule, but they adhere together, forming what are termed zoöglæa masses, the gelatinous material uniting together large numbers of bacteria in balls, or more generally in the form of skins or scums on the surface of the materials on which they grow (Fig. 3, *c* and *d*). The form of

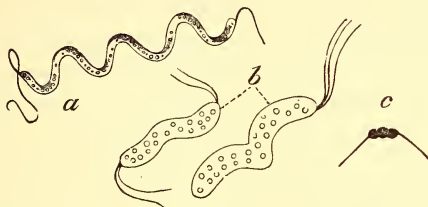
these scums or masses differs in different bacteria, so that different species may be recognized by this alone. The formation of zoöglœa occurs only at certain stages of the life of the organism, and in the case of the motile bacteria is preceded by a stage during which the organisms move freely in the fluid in which they are growing. It is a question whether this gelatinous substance is an excretion from the cell or only the outer layers of the cell-wall which have swollen up and become gelatinous (Zopf). It gives, according to Zopf, the reaction of mycoprotein in the putrefactive bacteria, but that of cellulose in those concerned in other fermentations; in both instances it contains a large amount of water.

Some bacteria are always motionless, others, for part of their life at any rate, swim about more or less rapidly in fluids, often becoming motionless at a later stage. In the latter case, when they become motionless they generally form a scum on the surface of the fluids in which they grow. As to the micrococci, it is doubtful whether or not they have the power of movement. Most writers regard the motion seen in the micrococci as entirely brunonian, but I am inclined to think that they may also have the power of spontaneous movement, for when sown in a flask containing a suitable nutritive fluid the latter very soon becomes quite turbid throughout, which could hardly happen were they entirely devoid of motion. Were that the case, they would naturally fall to the bottom and form a sediment, as is seen in the case of the motionless anthrax bacillus, which forms flocculent masses at the bottom of the flask, while the upper part of the fluid remains quite clear. Ogston has also described the movement of chains of micrococci observed under the microscope. In corroboration of this view is the statement made by Mr. E. M. Nelson, who is well known as a most expert microscopist, that he has seen micrococci with flagella, usually one to each coccus. I have seen his specimens, and certainly it looks very much as if flagella were present. Zopf also describes cilia in connection with cocci, especially in connection with what he holds to be the coccus stage of *cladotrix* and *beggiatoa*.

The character of the movements exhibited by bacteria in fluids is extremely diverse. Some have an oscillating pendulous movement, others whirl rapidly around their axis or dart forward and backward, while the spirilla again have a corkscrew motion. How the movements are brought about is not clear, and probably the mechanism is not the same in all cases. In some the motion seems to be due to contractions of the protoplasm of the cell itself, a sort of eel-like action. In others it may possibly be due to the flagella which have been seen in connection with them (Fig. 4). In several of the larger bacteria, and also in some of the smaller forms, long flagella can be seen at one or both ends of the rod. There is usually one at each end (Fig. 4, *a* and *c*), but Warming has described spirillar forms with two at each end, and in what he

looks on as a spiral form of *beggiatoa roseo-persicina* (*ophidomonas sanguinea*) he has found three at one pole (Fig. 4, *b*). In many motile bacteria no flagella have been demonstrated, and, supposing that they are present, this negative result might be due to two causes; either to retraction of the flagella during the process of preparation, or to the

FIG. 4.



a. Spirillum with cilia.

b. Spirillum with two cilia at each end, and one with three cilia at one end (*ophidomonas*; Warming).

c. Cholera bacillus with cilia. (From a drawing by Mr. E. M. Nelson.)

extreme fineness of the object, requiring very accurate illumination and very high-angled and well-corrected lenses to demonstrate them. The flagella are said not to take on the aniline dyes, but I think they do in some cases, though very faintly; they stain brown with a strong watery solution of logwood. Zopf believes that these flagella are directly continuous with the protoplasm of the cell (not with the cell wall), and that they can be retracted into the interior of the cell through an opening in the wall. They are thus, according to him, contractile structures. This view is founded chiefly on analogy with the active forms of the algæ, but Zopf has also directly observed retraction of the flagella on the application of reagents in the case of a form of *beggiatoa roseo-persicina*. Van Tieghem thinks that these flagella are simply elongated portions of the cell wall, and therefore not contractile structures nor organs of motion. The probability, however, is that they are, in many instances, really motile organs.

Bacteria increase in number mainly by fission. The cell enlarges, and after it has attained a certain size, a septum passes in from the sheath, dividing the protoplasm into two parts. The two cells thus formed may remain connected together or may separate and lead an independent existence, each giving rise again to new cells by a similar process. When they remain connected together they may continue to grow and divide, thus giving rise to long threads composed of a number of cells joined together. The young cells are not so long as the average adult organism. Thus, in the case of the *bacillus alvei* the average length of the rod is $\frac{1}{7260}$ th of an inch. These rods continue to increase in length till they have attained the $\frac{1}{5000}$ th of an inch, when fission begins in the middle. Hence the newly formed young cells measure about $\frac{1}{10000}$ th

of an inch in length. In the bacilli the division always occurs at right angles to the long axis of the thread. There is no evidence of longitudinal division in the ordinary forms of bacilli, but in closely allied organisms (*beggiatoa*, *crenothrix*, and *cladothrix*), which are by some, among others by Zopf, reckoned among the bacteria, longitudinal division has been seen to occur after repeated transverse division of the rods. In the micrococci the division may occur always in one direction, giving rise to long chains of cocci (*streptococci*), and these may form groups by twisting and interlacing of the chains. In other cases one coccus may split into four by division in two directions—transversely and longitudinally; and when these new cocci remain in connection with each other, small or large masses are formed (*staphylococci*). In the case of the *sarcinæ* the division occurs not only in two directions (transversely and longitudinally), but also in a third direction, so that one cell divides into eight, and thus a number of packets are formed. When division of cocci first occurs the opposed surfaces are naturally not round, and in some micrococci, especially the *gonococci*, they may remain for a long time flattened. In others, however, they rapidly become rounded off.

Growth of bacteria by budding, in the same way as occurs in the torulæ, is denied; but I have seen appearances in specimens of *bacillus alvei* which lead me to believe that this mode of growth may occur in the bacteria also.¹ In growth of bacilli by fission the rod elongates and having attained a certain size, it divides into two comparatively equal portions, but in the case to which I now allude, a full sized rod is seen with a small, somewhat conical knob attached to one end, and separated from the rod by a marked division (see Fig. 6, *b*).

Many bacteria, more especially the bacilli, form endospores. These correspond to the seed of higher plants in function and general properties. The spores of bacteria have a wonderful power of resisting the action of agencies which would destroy the adult or actively growing organisms. They thus provide for the reappearance of the organisms should the conditions become, for a time, unfavorable for their active growth. These spores retain their vitality in a dry state for a long time, and they resist the action of heat and chemical reagents in a striking manner. Thus a five per cent. solution of carbolic acid destroys the vitality of adult actively growing organisms in a few seconds, but must act for some hours before it kills spores.

When unstained bacteria containing spores are examined under the microscope, the latter appear as small, round, or oval, bright, highly refracting bodies in the interior of the rod. If the spore-bearing bacteria are dried on cover-glasses and stained, say with a watery solution of methyl-violet, the protoplasm of the rod takes on the violet stain, but

¹ Journal of the Microscopical Society of London, August, 1885.

the fully developed spore remains colorless. It is, however, possible to stain the spores of some bacilli, such as anthrax bacilli, in various ways, for instance, by immersing the specimen in a warmed solution of the fuchsin stain employed to stain tubercle bacilli, washing in dilute nitric acid, and staining with methylene-blue. The adult bacilli become blue, the spores retain the red color. This, and the other methods of staining spores, will be described later in greater detail.

The spores are shorter than the rods in which they form, but they are sometimes as broad (Fig. 5, *c*), or even broader (Fig. 5, *d*). They are round or oval in shape. There is generally one in each rod. They may be placed at one end of the rod or in the middle, or in some cases one at each end. In the moving bacteria, especially in those which form a scum, the commencement of spore formation is generally preceded by quiescence of the organism, but this is not universally the case. In *bacillus alvei*, for example, bacilli containing almost or apparently quite fully developed spores can be seen swimming about actively in the cultivating liquid. They appear generally when the bacilli have exhausted the nutriment in the material in which they are growing, but it is probable, as De Bary thinks, that the cause of their formation may also be that they have produced substances in the course of their development which check further growth, and lead to this provision being made against the entire destruction of the organism. Temperature has, however, much to do with the formation of spores in many cases. Many bacilli form spores readily enough at a low temperature, such as 16° C. or 17° C., but in the case of some organisms, spore formation occurs much more luxuriantly at the temperature of the human body. The pabulum on which they are growing, as well as many other unknown conditions, has also much influence. Thus the anthrax bacilli do not form spores inside the living body, while according to Ehlers the bacilli of symptomatic anthrax (*Rauschbrand*) form them only inside the body.

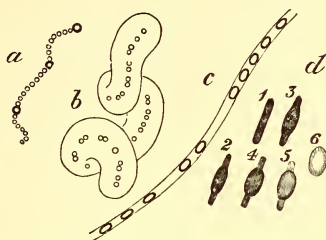
I have been able to study the development of spores in *bacillus alvei*, and other bacteria, by a very simple method, which is equally applicable to the study of the mode of development of other forms. Sterilize a number of cupped slides by placing them in a beaker plugged with cotton-wool, and expose them to a temperature of 140° C. for three hours. Prepare also a number of cover-glasses by passing them several times through a Bunsen flame, and place them on a sterilized glass plate beneath a glass shade. Inoculate a flask of sterilized meat infusion or other suitable cultivating fluid from a cultivation containing only bacilli and no spores. Place this flask in an incubator, at about 100° F., for two or three hours. During that time the bacilli, which swim freely, become distributed pretty equally throughout the fluid, and also multiply to a certain extent. By taking drops of equal size after thoroughly shaking the flask, each drop will probably contain about the same num-

ber of bacilli. A very minute quantity of fluid may be obtained by means of a syringe having a fine screw on its piston, and a large nut revolving on this screw. The quantity of fluid to be used is placed on the centre of the sterilized cover-glass, which is then rapidly inverted over the glass cell, a little vaseline being run round the edge to prevent drying. A number of slides are prepared in this way at the same time, and are then placed in an incubator kept at the temperature of the human body. From time to time slides are removed from the incubator, the cover-glasses rapidly taken off, turned upside down and dried. When dry, they are stained with suitable dyes, such as a watery solution of methyl-violet, and are mounted as permanent specimens. They can thus be studied at leisure, and the results obtained in this way are of course much more precise and free from error than when the observations are made on unstained specimens where the bacilli are swimming about in the fluid. At the same time the specimen can be examined immediately after removal from the incubator, if one wishes to see the condition of the living bacilli. In order to get full knowledge of the cycle of development of an organism, it is necessary to have a series of specimens taken at different times and showing the different stages. Hence the necessity for starting with the same quantities of the nutrient fluid, and the same number of bacilli; because, to take the instance of the formation of spores, whether this be due to exhaustion of the pabulum or to accumulation of the products of growth, it occurs when the bacillar development has reached a certain height. Hence, if in one specimen there are, to start with, more bacilli and less fluid than in another, spore formation will begin earlier in the former than in the latter, and thus the changes seen in the series of specimens will not be in proper sequence. I have found that by using three-fifths of a minim, calculated to contain one bacillus, and keeping the specimen at 36° C., the earliest appearance of spore formation was evident in the *bacillus alvei* in forty-one hours.

In specimens prepared in this way the first thing noticeable is that the rod begins to swell in its middle, and thus becomes spindle-shaped (Fig. 5, *d*, 3). This swelling, which in *bacillus alvei* generally affects the middle of the rod but may in some cases be most marked toward one end, increases in size (Fig. 5, *d*, 2), and the centre gradually ceases to take on the stain (Fig. 5, *d*, 4, 5). This unstained part becomes more clearly defined and surrounded by a capsule formed from the outer part of the protoplasm. Three or four hours later the rest of the rod is seen to have almost, or entirely disappeared, leaving the spore lying free in the fluid or enclosed within the remains of the original bacillus, which are faintly indicated (Fig. 5, *d*, 6). Of course, where the spore is not thicker than the rod in which it is formed, the bulging of the rod is not observed, but a mass of protoplasm seems to become separated in the

centre, and gradually to lose its power of taking on the stain. Many observers think that the difficulty in staining the spores is due solely to their being surrounded by a capsule impermeable to the stain, but this I very much doubt. I think it more probably indicates a difference in

FIG. 5.



- a. *Leuconostoc*, showing three enlarged cells (arthrospores).
 b. *Leuconostoc*.
 c. *Bacillus anthracis*, showing endospores.
 d. Development of endospores in *Bacillus alvei*. 1, the adult rod; 2 and 3, swelling of the rod at the seat of the spore; 4, 5, and 6, gradual differentiation of the spore.

the chemical constitution of the protoplasm of which the spore tissue is composed, for, as will be seen afterward, when the spore begins to sprout it gradually acquires the power of taking on the stain, although the capsule remains apparently unaltered and is afterward shed in its entirety. In the unstained specimens the protoplasm appears more opaque, or finely granular, at the point where the spore is being formed, and in the case of *Bacillus amylobacter*, the granulose reaction is said to disappear at that part of the rod. Zopf says that the first stage of the formation of spores is a contraction of the protoplasm of the cell which accumulates at the part where the spore is being formed. This is, however, not exactly the case, as shown by the stained specimens, where the ends of the rod which do not take part in the spore formation stain as usual, and apparently contain as much protoplasm. The formation of the spore is therefore due to a change occurring in a definite part of the protoplasm of the cell. The formation of endospores has, as yet, been observed only in the bacilli. Some authors speak of the occurrence of endospores in cocci and spirilla, but this is very doubtful.

The spores thus produced may lie dormant for an indefinite length of time, though apparently there are differences in resisting power between spores of different bacteria. When supplied with a suitable soil and temperature they sprout and give rise again to the adult bacteria. I have studied this change in the spores of *Bacillus alvei* in a manner similar to that described above (Fig. 6, a). Drops of cultivating fluid were placed on a series of cover-glasses; they were then inoculated with spores of this bacillus, inverted over glass cells, sealed with vaseline and placed at the temperature of 36° C. Slides were removed at various

intervals of time, the fluid rapidly dried on the cover-glass, stained and mounted in Canada balsam. In this case, where one wishes to study only the sprouting of the spores, it is not necessary to have the same quantities of fluid and the same number of spores in all the specimens, for if sufficient and suitable nutriment is present and a proper temper-

FIG. 6.



- a. 1 to 4, show sprouting of the spores of bacillus alvei; 5, an empty spore capsule.
 b. Bacillus alvei, showing an appearance of budding.
 c. Bacillus subtilis, showing sprouting of spores. (After De Bary.)

ature is maintained, the spores must sprout and probably they always take about the same length of time to do so. The first change which is observed in these specimens is that in many cases the outline of the rod in which the spore was formed becomes faintly visible (Fig. 6, a, 2). This can be seen in fifteen minutes, and is, I think, simply due to swelling by the fluid, as it is also evident to some extent in spores soaked in water for the same length of time. The next thing that is observed is that several of the spores take on the methyl-violet stain and become as intensely violet as the adult bacilli (Fig. 6, a, 3). The number of the spores which take on the stain in this way goes on increasing as time passes, till in about four hours almost all the spores stain violet. In three hours the first indication of the sprouting of these spores is seen. The stained part of the spore loses its oval shape, becomes elongated, and is soon seen to burst through the spore capsule at one end. It then presents the appearance of a short rod with a pale envelope embracing one end (Fig. 6, a, 4). This rod by and bye leaves the spore capsule altogether and goes on multiplying as a full-grown bacillus. In specimens taken after four or five hours all stages of growth can be observed, and the remains of the ruptured spore capsules are seen partly attached to the ends of rods and partly lying about the field (Fig. 6, a, 4 and 5). The sprouting of spores has also been studied, without staining, by Prazmowsky and others. The spore first loses its highly refracting appearance, becomes granular, elongates, and bursts through its spore capsule. In the case of *bacillus butyricus* the rod also passes out of one of the ends of the spore, but, according to De Bary, in *bacillus megaterium* and *bacillus subtilis* it bursts through the middle of the spore and then bends at right angles so as to follow the direction of the original rod (Fig. 6, c).

De Bary classes all the bacteria which do not produce endogenous spores as arthrosporaceæ. That is to say, certain cells of the colony

or chains of bacteria take on the qualities of spores, so as to serve as starting-points for fresh generations. It is doubtful whether there is much advantage in this division, for it is impossible, in many cases, to distinguish these cells from the other vegetative cells, and there is no evidence with regard to the ordinary bacteria that any of the cells in a colony of bacteria, which do not form endogenous spores, take on qualities different from the other vegetative cells, such as greater resisting power, different reaction with staining reagents, etc. The only cases in which the existence of bodies which must be looked on as arthrospores is proved, are the cases mentioned by De Bary, viz., *leuconostoc* and *bacterium zopfi* to which he also adds *crenothrix*, *cladothrix*, and *beggiatoa*. *Leuconostoc* consists of curved rows of round cells surrounded after a time by firm and extensive gelatinous masses (Fig. 5, *b*). After a time the greater number of cells in the chain die, but some cells retain their vitality, attain a somewhat larger size than the others, ultimately, by the solution of the gelatinous material, become free, and then serve as starting-points for new growths (Fig. 5, *a*). It may, of course, be that a similar thing occurs in all bacteria which do not produce endogenous spores, but at present it is a pure assumption that this is the case.

In addition to these modes of growth, various abnormal forms occur toward the end of the life of bacteria, which are not vegetative but involution stages. Chief among these forms are swellings of the rods, and they may be seen in most forms of bacilli after they have been cultivated for a long time without fresh addition of nutriment.

From the mode of growth of these minute organisms we must pass on to the consideration of the conditions which favor or hinder their development. These are very various and are as yet far from being fully understood. Bacteria vary very much as to their sensitiveness to the soil on which they are planted: some, such as *bacillus subtilis*, growing luxuriantly on a great variety of artificial soils; some, such as the tubercle bacillus, growing only on specially prepared soils; and others again like the leprosy bacillus, the comma-bacillus generally present in the mouth, etc., not growing at all on any of the artificial soils which have as yet been tried. It is, therefore, impossible to do more here than indicate some of the chief points; a detailed description of the best materials and methods of cultivation being given later.

Bacteria require for their growth, water, carbon, oxygen, nitrogen, and various inorganic substances.

A large amount of water is necessary for the growth of bacteria. If the material employed for cultivation is too concentrated, bacteria grow with difficulty or not at all. This fact is largely taken advantage of in manufactures, as, for instance, in the preservation of fruits by sugar. If the material is quite dry, no microorganisms will grow on it. When there is a little moisture present, moulds may appear, but it is only when

the amount of water is considerable, at least over fifty per cent., that bacteria appear. On the other hand, there must not be too much water,—in other words, the nutritive material must not be too dilute. Many bacteria, more especially the bacteria of putrefaction, grow readily enough even when the amount of nutriment in the water is very small, but this is not the case with all bacteria. Thus Koch has found with regard to the bacillus of cholera, that if the ordinary meat infusion used for cultivating these organisms (made by infusing one pound of meat in a litre of water) be diluted from five to ten times, it becomes unsuitable for their growth. Somewhere about eighty per cent. of water should probably be present in a good cultivating medium.

As the bacteria, owing to the absence of chlorophyll, cannot break up carbonic acid, they must get their carbon from various organic compounds. The best of these is sugar, and next to it come, according to Nägeli, mannite, glycerine, tartrates, etc. As a rule, however, it is the more complex substances which contain nitrogen also, such as peptone, which are utilized by the plants as the source of their carbon.

The nitrogen is generally obtained from the albuminates, which, however, must be peptonized before they can be taken up as food. Many bacteria growing in neutral or alkaline materials do this for themselves by the production of a peptonizing ferment. The nitrogen may also be obtained from the amides or amines such as acetamid, methylamin, leucin, urea, etc., also from salts of ammonium, such as the tartrate, lactate, etc.

Oxygen is necessary for the respiration of the bacteria, carbonic acid being given off during growth. Most bacteria take up the free oxygen from the atmosphere; a few, however, seem to prefer to take it from the substances in which they are growing. Hence the bacteria were divided by Pasteur into two groups; the aerobic organisms which take up free oxygen, and the anaërobic or those which can do without it. Pasteur thought that oxygen was not only unnecessary but even hurtful to the anaërobic bacteria, but this view is doubtful; at any rate, the organisms to which oxygen is hurtful are fewer in number than Pasteur at first thought, and probably even these require a little free oxygen to start their growth. The best example of a true anaërobic organism is the bacillus of malignant œdema (*vibrion septique*, Pasteur), which will not develop in the presence of oxygen, but grows readily enough if it is absent. Gaff'ky was able to cultivate it in the interior of potatoes. Many aerobic organisms grow very well without air under suitable conditions. In order to cultivate either class of organisms without air, they must be placed in a material which can undergo fermentation. Under these circumstances, according to Pasteur, fermentation goes on more actively than when air is admitted. Many aerobic organisms, however, act quite as powerfully, or even more so, in the presence of oxygen as without it.

If the cultivating material is not a fermentiscible one, then air is required for the growth of the aërobic organisms.

The bacteria require only small quantities of mineral substances. According to Nägeli, the following are necessary: sulphur (in the form of sulphates), phosphorus (as phosphates), potash, which may be replaced by cæsium or rubidium, but not by sodium; and calcium or magnesium, which may also be replaced by barium or strontium. Pasteur, in his work on spontaneous generation, demolished the contention of his opponents that the bacteria originated from the albuminoid materials present in the cultivating liquids by showing that these materials were not necessary for the development of bacteria and fungi, but could be replaced by various salts. The fluid which he employed had the following composition:

Distilled water	100 grammes.
Sugar candy	10 “
Tartrate of ammonia	2 to 5 “
Ashes of yeast	4 “

Cohn modified this solution chiefly on account of the difficulty of calcing the yeast, and proposed the following:

Acid phosphate of potash	0.1 gramme.
Tribasic phosphate of lime	0.1 “
Sulphate of magnesia	0.1 “
Tartrate of ammonia	1.0 “
Distilled water	100.0 c. cm.

Nägeli proposes the following mixture, founded on an analysis of bacteria:

Basic phosphate of potash	0.1035 gramme.
Sulphate of magnesia	0.016 “
Sulphate of potash	0.013 “
Chloride of calcium	0.0055 “
Tartrate of ammonia	1.0 “
Water	100.0 c. cm.

These solutions are not, however, suitable for general use, for though some bacteria grow well in them, a great many, more especially the pathogenic ones, require a more complex soil, and in the case of some a proper soil has still to be discovered. An immense amount of work yet remains to be done on this subject. With regard to these mineral substances, it should be remembered that where meat is employed for making the cultivating material it is unnecessary to add any salts, as they are already present in sufficient quantity in the meat.¹

¹ Raulin (Comptes Rendus, t. 56, p. 229) has made out some very interesting facts with regard to the quantity and kind of mineral substances required by *aspergillus niger*.

Apart from the constitution of the cultivating material, many other conditions come into play in the way of favoring or hindering development. Thus, the reaction of the cultivating medium is in many cases of great importance. Most bacteria grow best in a neutral or slightly alkaline medium. To many even slight acidity of the medium is injurious, to some the reaction is more or less indifferent. *Bacillus subtilis*, *bacillus anthracis*, the cholera bacillus, and others, do not grow in meat jelly if it is not neutralized, or if any growth occurs it is very slight. Although this is the case with regard to those bacilli growing in meat jelly, all acids do not apparently prevent their growth, for under certain conditions they flourish well on the surface of boiled potatoes, which is also acid. To micrococci the reaction of the medium does not much matter, they grow well in slightly acid media. A few organisms even grow best in an acid medium, such as the bacillus of blue milk, the *bacterium acetii*, etc. Although it is the reaction, in general, which is usually spoken of as injurious or favorable to growth, it is a question whether this is the exact truth, and whether it is not rather the presence or absence of particular acids and alkalis which is the important point. That this may be so, is shown by the examples mentioned above of the cholera bacillus, etc., growing on the acid potato, but not in the acid nutrient jelly.

Another very important condition for growth is the temperature. The range of temperature in which bacteria will grow varies very much according to the species, but may be stated generally as from 5° C. to 50° C. For the majority of bacteria the range is less, the most general range being from 16° C. to 45° C. Some of the pathogenic bacteria will only grow at a temperature approaching that of the human body; thus, the range of the tubercle bacillus is about from 30° C. to 42° C. *Bacterium termo* and *bacillus subtilis* can grow at 5° C. Van Tieghem describes a bacillus which grows in neutral solutions at 74° C. While there is thus a considerable range of temperature within which bacteria can grow, there is, however, a degree of heat which is the best for growth, and probably this best temperature differs considerably in different species and, to some extent, according to the medium in which they are growing. Thus, while the tubercle bacillus can grow between 30° C. and 42° C., it grows best at 37° C. Finekler's comma-bacillus, when cultivated on potatoes, grows better at 18° C. than at 37°. The cholera bacillus, on the other hand, although it grows in neutral jelly at 20° C., grows on potatoes only at a higher temperature. With regard to temperature, it is also important that it should be constant; this is more especially the case with those which require the higher temperatures for their development.

Experiments have been made on the effect of light on the growth and movement of the bacteria, but without yielding any definite results. The only two facts worth mentioning are a doubtful one by Engelmann

with regard to an organism which he reckons among the bacteria, the movement of which was dependent on light, more especially on the ultra-red rays of the spectrum, and an observation by Zopf that in cultivations of *beggiatoa roseo-persicina*, the deposit of bacteria was greater on the side of the vessel turned toward the light than elsewhere.

It is stated by Horvath and others that violent movements of the cultivating fluid interfere with the growth of bacteria, while a steady flow does no harm.

Pressure exerts a certain influence on the growth of bacteria, and when very high may even kill them. Thus Paul Bert found that after meat was subjected for three days to a pressure of sixteen atmospheres and then the pressure restored to the normal, with precautions against the entrance of fresh germs, putrefaction did not occur, showing that the putrefactive bacteria had been killed by the high pressure. From a large number of experiments Bert found that a pressure of twenty-one atmospheres is sufficient to kill the organisms which cause putrefaction. It is probable that it is the oxygen which is the active destructive agent. To kill the *bacterium lactis* in milk, it was necessary to employ oxygen at a pressure of about twenty-five atmospheres, and to have only a thin layer of fluid.

Electricity also affects the growth of bacteria. Cohn and Mendelsohn obtained the following results with regard to the effects of the constant current on bacteria growing in mineral cultivating liquids. A battery of two elements rendered the fluid unsuitable for growth in twenty-four hours, more especially that at the positive pole, the fluid at that pole becoming strongly acid, that at the negative becoming alkaline (from formation of ammonia). The bacteria themselves, however, were not killed, but developed readily when introduced into fresh cultivating fluid. A battery of five cells killed the bacteria completely in twenty-four hours. They explain this as the result of the electrolysis. The induction current had no effect. Somewhat similar results were obtained in the case of *micrococcus prodigiosus* growing on the surface of boiled potatoes. The fluids of the potato become acid at the positive pole and alkaline at the negative. With weak currents there is a broad colorless zone in the neighborhood of the positive pole, and a much narrower one around the negative pole, while the rest of the potato is covered with the red growth. The stronger the current the broader is the zone at both electrodes in which the micrococci cannot develop; with very strong currents the micrococci are killed.

Various other unknown conditions, meteorological and otherwise, no doubt influence the growth of bacteria in the outer world. A striking instance of this was mentioned by Koch at the second cholera conference held at Berlin in May, 1885.¹ "The town of Bombay has for some

¹ Berliner klin. Wochenschrift, No. 376, 1885.

years been provided with water from a neighboring island. A valley has been dammed and thereby an artificial lake, the Vehar lake, has been formed. In this lake, which is filled with the water from the tropical summer rains, the water every spring, some months before the commencement of the monsoon, becomes suddenly turbid from the development of numerous microorganisms. According to the drawings, these seem to be a form of bacteria. Immediately after the commencement of the monsoon, and yet before the rain has had any important influence on the water, this bacterial vegetation disappears suddenly and the water becomes clear. One could not say in this case that the rain had caused great dilution, or in any other way had an influence on the water in the Vehar lake. These microorganisms have thus their definite periods of vegetation without our being able to say with certainty why this occurs."

The length of life and retention of vitality of bacteria under adverse circumstances vary much in different species of bacteria, and in the case of spore-bearing bacteria they also depend on whether the organisms are in the spore stage or in the adult condition. Much depends on the soil, on the temperature at which they are kept, and on the presence or absence of oxygen. In nutrient jelly kept at 16° C. or 17° C., the life of micrococci varies much, from four to six weeks to several months, and similar variations are observed in regard to bacilli. The cholera bacillus, for instance, remains alive for six to eight weeks in tubes containing about 10 c. cm. of the nutrient jelly; on agar-agar jelly they have been found to retain their vitality for 170 days, and even longer. In fluids, micrococci live a much shorter time, especially if they are kept at the body temperature freely exposed to air and in only a thin layer of fluid. When working with micrococci from aseptic wounds cultivated in a small quantity of unneutralized cucumber infusion at the temperature of the body, I found that they died in from two to four days. Whether this was due to exhaustion of the pabulum, to formation of products injurious to them or to the temperature and oxygen, I cannot say. Nor have I investigated whether this holds good with regard to other micrococci or to the same micrococci grown in fluids of different composition. Apart from what may be looked on as the natural death of these organisms as the result of exhaustion of food, of destruction, by their own products, of the effects of oxygen, etc., their growth and vitality may be interfered with in various ways, such as by dryness, by temperature, and by the action of various chemical substances. The discussion of these matters will, however, be more conveniently dealt with when we come to consider the subject of disinfection.

A much debated question with regard to bacteria is the existence of distinct species and varieties. Some writers, such as Billroth, Warming, and others, have denied the existence of distinct species, and consider

that there is only one species of bacteria from which all the various forms are derived, the organism assuming different forms and functions according to the circumstances in which it is placed. These statements, however, rest on two errors; the first being that impure cultivations containing a variety of bacteria have been worked with, and the second, that too much stress has been laid on the microscopic characters. Of course, if one starts with the view that species of bacteria do not exist, and under this idea experiments with any admixture of bacteria which comes to hand, one will very soon come to believe in its accuracy; for, if inoculation be performed into different soils from the original mixture, one will obtain in the one micrococci, in the other bacilli, and so on according as the soil is more suitable for the growth of one or other form of microörganism. And it may be that, assuming the original culture to be pure, the observer concludes that he sees a transformation of one form into another according to variations in the nature of the soil. The other error is equally grave. With such minute objects as bacteria, it is hardly to be expected that the microscope will show sufficient differences in many cases to enable the observer to say that he has different forms before him. It is necessary, in judging of the existence of species, to have pure cultivations, and to take into consideration other characteristics besides mere form. This is the more important, as the same kind of bacterium often differs greatly in form according to the conditions under which it is grown. Thus, take the cholera bacillus for example, when grown in meat infusion at the temperature of the body, it is at first hardly, if at all, curved. When grown in neutral jelly at 20° C., almost all the cells are slightly curved; but in many the curve is not very marked. When the jelly is slightly acid the growth is slower, and all the organisms are markedly curved. When ten per cent. of alcohol is added to the neutral jelly, almost all the organisms have the spirillar form. How would it be possible, by means of the microscope, to say that these were all forms of the same organism? But, by taking into account their other characteristics, such as the mode in which they grow in different media, a decision can readily be arrived at. Inoculate neutral jelly from the meat infusion, from the neutral jelly, from the acid jelly, or from the mixture of alcohol and jelly, and the resulting growth will be similar in all cases, showing that the same organism is being dealt with. By looking at the subject in this way, and taking all the characteristics into account, there can be no doubt that many definite species or varieties of bacteria do exist having definite characteristics, the sum of which enables them to be distinguished one from another. Wherever these characteristics are proved not to be accidental, but constant, one must assume that, however nearly allied, the bacteria are different, the only question being whether they should be looked on as distinct species or only as varieties of the same species. Wherever an

organism is found differing in some point or points from any other known form, it is, I think, always safer to look on it provisionally as a new species. It may subsequently turn out that it includes a number of species, or that, on the contrary, it is a form of some species already known. On the other hand, to assume at once because the differences between two evidently allied forms are slight that therefore they are identical is not philosophical, and can only, as, indeed, it has already done, lead to endless confusion.

Another point to which reference must be made is that of the constancy of species. Many observers, paying attention only to the microscopical appearances, have held that one species could be readily transformed into another by altering the conditions under which it grows. But when these statements have been put to the test they have been found wanting, and there is no instance known, although numerous efforts have been made to obtain this evidence, of an organism possessing certain definite characteristics being transformed into another presenting other characters. Here, again, the change in form assumed by various bacteria under different circumstances has misled observers into believing that with the change in form they have changed their characters. That this is not so is shown by the example of the cholera bacillus mentioned in the previous paragraph. However probable it is that in the course of ages bacteria may have undergone slow change, there is no evidence nor probability that this occurs more rapidly in them than in other living things, and therefore the evolution theory is no bar to the acceptance of the existence of permanent species and varieties among the bacteria as among other plants and animals.

The distribution of bacteria in nature is very wide—indeed, they may be said to occur everywhere. They are probably present in smaller numbers in the air than elsewhere.

That they may be present in air has been recognized from the very early experiments on bacteria with reference to the question of spontaneous generation, when Spallanzani hermetically sealed his flasks to prevent their entrance, when Schulze interposed sulphuric acid and caustic potash between the air and the putrescible material, when Schwann heated the air which had access to the flasks, and Schröder and Dusch filtered it through cotton-wool. Pasteur was the first, however, who went into the matter more thoroughly, and showed that the air in different places and at different times contained varying numbers of bacteria. Numerous attempts have since been made to estimate the numbers of bacteria in a given quantity of air by drawing the air over plates smeared with some glutinous substance, such as glycerine, or by catching the particles in gun-cotton, etc., and then counting the number of spores or bacteria by means of the microscope. This is a most inefficient method, as it is impossible, on the one hand, to recognize

all the spores and bacteria present, and, on the other, of those seen it is impossible to say which are alive and which are dead. Miguel has gone into the question of the bacteria in air very carefully, both by methods similar to those just mentioned, and also by cultivation in fluids by aspiration of a given quantity of air through cultivating fluids. He has made out some very remarkable results with regard to the number of bacteria in the air at different seasons of the year, and at different hours of the day. During rain the number of bacteria in the air is small, as would naturally be expected, while they increase in number during periods of drought, but apparently decrease again if the drought lasts longer than a week. In autumn and winter there were much fewer bacteria in the air than in spring and summer, but this is apparently not always constant, and further facts are required. As regards the hourly variations, Miguel has made an extensive investigation, and he finds that, independent of rain and other causes which alter the number of bacteria, there are certain fairly constant hourly variations. At noon till one o'clock there are but few bacteria present in the air, from one the numbers increase till eight in the evening, when they again diminish till between one and three in the morning, when increase again occurs. The minimum is at noon, the maximum apparently from eight to ten in the evening. Miguel ascribes these hourly variations to variations in the obliquity of the currents of air. Of late, Miguel has employed the gelatine cultivation methods by spreading the nutrient jelly on a thin sheet of paper, and fixing it around a revolving drum against which a current of air is projected. The germs are thus sown on the prepared paper, which is then placed in a suitable place for development.

In Koch's laboratory, methods of examining air have been devised which are more trustworthy than those just described. Koch exposed plates, covered with nutrient jelly, to air for a given time, and then covered them up and placed them in suitable conditions for the occurrence of development. As the medium was solid, each microorganism which fell on it developed where it fell, and by-and-by its progeny formed a mass, or colony, visible to the naked eye. By counting the number of colonies one could estimate approximately the number of microorganisms which fell on the material, and could further tell the kinds. In reality this is only a qualitative test, because the volume of air over the plate being constantly changing, no definite result was obtained as to the number present in a given quantity of air. Hesse has improved this method, and made it not only a qualitative but a fairly accurate quantitative test. Through a tube coated with nutrient jelly a given quantity of air is drawn at a given rate in the manner to be afterward described. The germs in the air are deposited on the jelly and grow there. After a sufficient quantity of air has been drawn through the tube it is closed and placed at a suitable temperature for development.

The number of colonies which appear are counted, and the kinds of bacteria present are ascertained. By proceeding in this way Hesse has made out some very interesting facts, of which a few may be mentioned. Experiments were made in the open air, in Berlin, in winter, and showed that during a drizzling rain 12 germs (bacteria or fungi) were present per litre of air; during snow, 0.26 per litre; when dry, 0.5 per litre; on the top of a tower, 0.8 per litre; in the court beneath, 2.2 per litre. In Hesse's sitting-room, the following results were obtained: during the day, 7 germs per litre; while the room was being dusted, about 20 per litre; immediately after supper, 6 per litre; and at midnight after the room had been empty for some hours, only 1 fungus was found in 5 litres. Very interesting results were obtained in hospital wards: in one ward, containing 17 beds, which communicated with two other wards each of which contained 11 beds, 3 germs per litre were found when the ward was still; in one with 14 beds, there were also 3 per litre; and in another with the same number of beds, there was 1 per litre. In the surgical wards (18 beds), just after sweeping, there were 12 per litre. The air in a schoolroom was tested (a) before the class assembled, when 2 germs per litre were found; (b) while the class was going on, 16 per litre; and (c) while the class was being dismissed, 35 per litre. In rooms not kept clean or quiet there were many more organisms: thus, in the stall where the animals for experiment were kept, from 40 to 65 germs were present per litre, while the animals were being fed, and the much larger proportion of bacteria to fungi was very noticeable. In the rag sorting room of a paper-factory the germs present in a litre of air were so numerous that a precise estimate could not be made. Hesse further found that the air passing through thickly packed moist earth or dung did not carry bacteria with it, and this was also the result obtained by forcing air through water containing numerous putrefactive bacteria. Hesse made the interesting observation that the bacteria in air were attached for the most part to particles of dust, while the spores of fungi were not. This was shown by the fact that, if the air were drawn through porous sandstone, no bacteria developed while fungi did; the spores of fungi being larger than those of bacilli, the latter must have been attached to some gross particles. With regard to all these methods of examining air by cultivation, it must be remembered that the result is only approximately accurate, for germs may be present which will not grow on the nutrient jelly at the temperature at which it is kept—as *e. g.*, the tubercle bacillus; or, on the other hand, germs may grow, but grow so slowly that neighboring colonies may cover them, or may liquefy the jelly before their colonies are apparent, or, again, germs capable of growing in the material may lie on the dry surface without taking root. Other modified methods of examining air will be described afterward.

As air in almost every situation contains microorganisms or their

spores, it follows that dust must likewise contain them and, of course, in very much larger quantity. This can be proved by a very simple experiment. Pour out some liquefied nutrient jelly on a sterilized glass plate and allow it to solidify in a moist chamber protected from dust. Then with a sterilized penknife pick up a minute portion of dust and scatter it over the surface of the jelly. In a few days a large number of colonies, more especially of fungi, will be seen on the surface, corresponding to the particles of dust which fell on it. The number and kinds present will depend on the age and the dryness of the dust. The drier and older the dust, the fewer micrococci and adult bacilli remain alive in it, till ultimately only the spores of bacilli and fungi, more especially of the latter, remain capable of development.

As dust is present everywhere, so these spores of bacteria and fungi are also present everywhere, on all surrounding objects and more especially on the surfaces of our bodies. The last is a most important fact to remember in connection with the treatment of wounds. On the skin, moreover, they are not only present in the spore stage, but, being in the presence of both heat and moisture, they also exist in the growing form. On the skin the micrococci are apparently much more numerous than the bacilli. This probably depends to a great extent on the acidity of the sweat being more favorable to the growth of micrococci than of many forms of bacilli. Their presence in the growing form rather than in the spore stage is very important, as rendering disinfection of the skin by means of carbolic acid more efficacious than if spores only were present.

Bacteria form a very important part of the constituents of the superficial layers of the soil, being concerned, as we shall see presently, in breaking up the complex organic substances of which soil is largely composed and more especially in carrying on the process of nitrification. All sorts of bacteria may be present in the soil, but there are certain forms of bacilli which are always found in large numbers and which are apparently constantly present. Koch found in his early investigations that the number of microorganisms in the earth diminished the deeper he went, till at the depth of scarcely a metre the earth was almost free from microorganisms. These investigations were made in winter and require to be repeated.

In water also bacteria are always present, often in considerable numbers, varying, of course, according to the amount of pabulum (organic matter) present, the stagnation or rapid flow, etc. Koch's method of testing water is to mix a certain quantity of the water (generally one c. cm.) with ten c. cm. of liquefied nutrient jelly; pour the mixture out on a sterilized plate of glass, allow it to solidify, and then place it in a moist chamber, protected from dust and kept at a temperature suitable for development. The results obtained by this method of testing

water are now added to the reports of the chemical examination of water issued from the Sanitary Institute, in Berlin, and this examination will, no doubt, soon be everywhere recognized as an essential part of water analysis. The following facts taken from Dr. Wolffhügel's report on the Berlin water will give a general idea of the ordinary distribution of bacteria in water.¹ The results were obtained between July, 1884, and March, 1885. In river water, before filtration, the highest average number of bacteria during one month occurred in October when there were 3251 organisms per c. cm. of water. The smallest number was during November, when there were 466 per c. cm. After filtration through sand the numbers in October per c. cm. of water were 21, and in November 27. In other water-works, where the water was taken from a lake, the highest number in the unfiltered water was 890 per c. cm., in March, and the lowest 167, in September; after filtration through sand these numbers fell to 45 and 38 respectively. In the Berlin tap water the number of bacteria varied from 12 per c. cm. in Wilhelmstrasse, in November, to as high as 409, in July, in Friedrichstrasse, the average for the nine months in five different streets in Berlin being 78 per c. cm.

Bacteria are, of course, especially numerous in all putrefying materials, for, as we shall see presently, the decomposition of organic substances is the result of the growth of bacteria. In sewage, Dr. Warden has found as many as 38,000,000 per c. cm.

We have seen that bacteria are present everywhere on the outer surface of the living body. They are also present on several mucous surfaces, more especially in the nose, mouth, and intestinal canal. In the mouth there is a great variety of different kinds of bacteria present; in the intestine they are chiefly bacilli, of which at least five different kinds are, according to Bienstock,² constantly present in the healthy adult, two of which, at any rate, are very important agents in digestion, one decomposing albumen and producing among other substances phenol and indol; the other decomposing hydrocarbons and producing alcohol and lactic acid. Escherich³ found that the meconium of children dying during birth did not contain any bacteria, but they could be found in from four to twelve hours after birth in feces taken from the rectum. The earliest forms found are mostly cocci and torulæ, but bacilli very rapidly appear, and in twenty-four hours the bacteria are as numerous as in the intestines of adults, and of many different kinds. Most of these diverse forms disappear in from eight to ten days, when the following condition is found. In the feces of infants which have no other food than the mother's milk, there is one form of small bacillus present in such

¹ Arbeiten aus dem Kais. Gesundheitsamte, vol. i., 1885.

² Ueber die Bacterien der Fæces. Zeitschrift f. klin. Med., vol. viii.

³ Fortschritte der Medicin, Nos. 16 and 17, 1885.

enormous numbers that one might think that the intestinal contents contained a pure cultivation of this organism. They can slowly coagulate milk and act on the grape sugar. Another form, which is much less numerous, closely resembles the *bacterium lactis* and produces similar effects on milk. Other forms of bacilli and micrococci are present in small numbers in the feces of infants. Bacteria do not occur in the healthy stomach, probably on account of the acidity, but in diseased conditions, such as cancerous stricture of the pylorus, where the secretions are no longer normal, various forms, more especially sarcinæ, may be found.

A most interesting and important question is whether bacteria are normally present in the tissues and juices of the healthy living body.¹ This has now been shown not to be the case, or at least, if they do penetrate into the body, they are rapidly destroyed. Indeed, it seems as if they could not penetrate even into the healthy cutaneous or mucous glands, though when these are unhealthy they very soon enter. Of course, I speak of non-pathogenic forms.

As to vegetables, Van der Broeck, Pasteur, and Roberts, showed the absence of organisms in the fresh grape. The mode in which Roberts did this was as follows: pipettes were constructed, the upper ends of which were plugged with cotton-wool, while the lower were drawn out to a point and sealed. These were sterilized, some of them containing sterilized water and some not. One spot on a grape was heated in the flame of a spirit lamp to destroy adhering germs and then the point of the pipette was forced through the skin at this place, broken off in the interior of the grape and a little of the juice collected in the pipette. The orifice was again sealed, and it was found that no organisms grew either in the tubes containing pure grape juice or in those containing a mixture of grape juice and water. By proceeding in a similar manner, Roberts succeeded also with turnips, potatoes, oranges, and tomatoes. Of course, the attempts were not always successful, but in all experiments of this kind a certain margin must always be allowed for unavoidable errors.

In the case of animal tissues there is now a large amount of evidence to show that bacteria are not normally present in the tissues in health—at any rate, that they are neither present in any numbers nor for any length of time. That they may now and then gain access to the healthy blood through scratches, etc., is extremely probable, but they very rapidly die and are excreted by the kidneys. In December, 1877, I commenced a series of experiments on this subject which definitely proved that bacteria were not normally constantly present in the blood

¹ Details of the researches on this subject will be found in my *Antiseptic Surgery*. London: Smith, Elder & Co., 1882. Chapter II, and also pp. 195 and 248.

or organs, as had been assumed by previous investigators, notably by Billroth and Tiegel. My plan was to transfer portions of the tissues and organs of healthy rabbits, with various precautions, to vessels containing sterilized infusions, in which bacteria would grow readily. After plugging the vessels with cotton-wool they were placed in an incubator kept at the temperature of the body. The result was that in a number of instances no development whatever occurred, showing that at least none of the ordinary microorganisms were present in the tissues. In two cases development did occur, twice in connection with the kidney, and once in connection with the liver. The explanation of this may either be error in manipulation or the presence of microorganisms in the tissue. As large portions of the organs were used, it would not be surprising if an organism had been present in the circulating blood and had not yet been destroyed. Similar experiments have been performed by Meissner and others. Meissner was able to preserve the internal organs of cats and rabbits in contact with boiled water and pure air for three years without any development of microorganisms.

A number of observers have also shown that microorganisms are not present in the healthy blood, nor in such secretions as milk and urine when freshly drawn from the body, the latter fact proving, also, that bacteria cannot penetrate along small mucous canals when the surfaces are healthy and in apposition.

It is not, however, necessary nowadays to detail the elaborate experiments which have been performed on this subject, for all who work much at bacteriology constantly attempt cultivations in new investigations from blood and tissues with negative results. For instance, in the experiments on the cultivation of the organism of tubercle, numerous negative results have been obtained. Thus, kill a tuberculous animal and make cultivations with its blood or portions of its organs on nutrient jelly, or in fluids kept at the ordinary temperature of the air. The result will be negative, unless in the rare cases of mixed infection, where micrococci are present in the blood, for the soil and temperature in this case are unfavorable to the growth of the tubercle bacillus. But the conditions being favorable for the growth of ordinary bacteria, the negative result shows that they were not present even in this diseased animal. But it is unnecessary to multiply instances of this kind, for if bacteria were normally present in the blood and tissues our present methods of examination and cultivation from the living or dead body would prove quite insufficient, and would have to be made much more complicated.

In discussing the origin of the bacteria found in fermenting materials and in disease, it is not necessary at the present day to do more than allude to the old theories of spontaneous generation, now completely exploded. This question, which has done much good in attracting attention

to these organisms and in leading to their study, and the introduction of improved methods of research, has been completely set at rest by the experiments of Pasteur, Tyndall, and others, and by the accumulated experiences of all recent workers in the field of bacteriology.¹

THE FUNCTION OF THE RECURRENT LARYNGEAL NERVE.²

FROM EXPERIMENTAL STUDIES IN THE BIOLOGICAL LABORATORY OF
THE JOHNS HOPKINS UNIVERSITY.

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THE mode of action of the recurrent laryngeal nerve, supplying as it does muscles so important in their use, both phonatory and respiratory, and yet so opposed in their action, is at present a much mooted point. That this nerve supplies all the intrinsic muscles of the larynx with the exception of the crico-thyroid, and that it is chiefly a motor nerve, are well-known facts. It is a physiological fact, also, that the internal thyro-arytenoids, the lateral crico-arytenoids, and the transverse arytenoid, are the adductor (the phonatory) muscles of the larynx, and that the posterior crico-arytenoids are the abductor (the respiratory) muscles of that organ. As we have said, all these muscles receive their nerve supply from the recurrent laryngeal. This nerve, then, must contain two sets of fibres, which innervate muscles of separate and distinct functions. How, and under what circumstances, does the constrictor or respiratory function of this nerve assert itself? How are these functions to be differentiated? Whence do the two distinct sets of impulses come? Is the origin of the nerve filaments, which compose the recurrent laryngeal nerve, as distinct as their function. (Hooper.)

This important question has, up to the present time, been unanswered, and we know of no experiments directly on this point until Dr. F. H. Hooper, of Boston, in 1885, published an important and interesting paper, entitled "The Respiratory Function of the Human Larynx, from Experimental Studies." In this article he considers the question stated above, and also whether (as the clinicians assert) the abductor fibres of the recurrent nerve are more vulnerable than those of the adductor. It was this paper which immediately attracted the writer's attention to this subject, and led him to undertake the experiments given below, particu-

¹ For a full discussion of the history of this subject, and of the evidence for and against it, see my *Antiseptic Surgery*, pp. 145-204.

² Admission thesis to the American Laryngological Association, May, 1886

larly as Dr. Hooper had said, "positive as were the results of this series of experiments, we lay no stress upon them. If they are of any worth, it would be by suggesting to others some better method than was here employed, *for all our attempts to verify the observations have failed.*"

As my purpose then was, if possible, to verify and expand Dr. Hooper's experiments, I am compelled, in order to make myself intelligible, to go over somewhat the same ground in the elaboration of this paper.

Speaking generally, nervous impulses for the larynx start in the brain, the medulla, and the cord. That there is a motor centre for the larynx is, to say the least, doubtful; and Delavan's¹ conclusions from the two cases cited by him, viz., "that this centre is in the course of the third branch of the middle cervical artery, that it is toward the proximal end of this vessel, and that it is in the vicinity of the convolution of Broca," are hardly justifiable in view of our scant knowledge of the subject, physiological and clinical. Nerve impulses are transmitted to the larynx through the pneumogastric, the spinal accessory, and their anastomotic branches. The pneumogastric is connected, first, with the internal branch (which contains the medullary fibres) of the spinal accessory; second, with the facial nerve by the auricular branch; third, with the glosso-pharyngeal (an inconstant branch); fourth, with the hypoglossal; fifth, with the first and second cervical nerves; sixth, with the sympathetic system.

The manifold nervous impulses which may come through all these sources are carried to the larynx, then, by the superior and inferior laryngeal nerves, the anatomy and distribution of which need not be given here.

The part played by all these nerves in the innervation of the larynx is greatly in doubt.

The vagus and spinal accessory, however, are the nerves which immediately preside over the respiratory and phonatory functions of the larynx. The spinal accessory would seem to be chiefly a motor nerve (Bischoff;² Morganti,³ Longet,⁴ Bernard⁵).

Bernard declares that the spinal accessory is the motor nerve for *phonation alone*, and that it has nothing to do with the respiratory function of the larynx, which, if I understand him right, is the view taken by Schech.⁶ It is none the less certain, however, that the recurrent nerve contains sensory as well as motor fibres, for we can obtain reflexes from the larynx after section of the superior laryngeal. This latter is the afferent nerve supplying the mucous membrane and a motor fibre for the crico-thyroid muscle (denied by Navratil⁷). Some

¹ On the Localization of the Cortical Motor Centre of the Larynx, N. Y. Medical Record, p. 178, 1885.

² Nervi acces, etc., Heidelberg, 1832.

³ Extract in Schmidt's Jahrb., xlii. p. 280.

⁴ Traité de Physiologie, vol. iii. p. 516.

⁵ Leçons sur la phys., vol. ii. p. 244.

⁶ Die Funct. d. Nerven u. Muskeln des Kehlkopfs, Würzburg, 1873.

⁷ Berl. klin. Woch., 1871, p. 394.

observers hold that it also supplies a branch to the posterior arytenoid. The recurrent nerve therefore containing, as it does, both sensory and motor fibres, from whatever source they come, supplying all the muscles of the larynx except the crico-thyroid (though Türck¹ says that it furnishes fibres to this muscle also), and being essentially the respiratory nerve of the larynx, is the nerve with the innervation of which we are immediately concerned. How is it, then, that the impulses travelling along this nerve, at one instant close and at the next open the glottis? How is it that at one moment the nerve stimulus acts upon one set of muscles (the adductors), and at the next upon another and distinct set (the abductors). Those most important muscles, the posterior crico-arytenoids, receive, says Hooper, an abundant nerve supply, and it is more than probable that the nerve filaments in the recurrent are derived from a greater number of sources than those in the phonatory nerves. The experiments given below were undertaken to test Hooper's theory of the innervation of the larynx, and as it is original with him, I shall give, in his own words, the reasoning on which he founded his theory:

"It is a familiar fact to all, that if anything other than air finds its way into the larynx it produces, by reflex action, a sudden closure of the glottis. It is equally certain that, under normal conditions, the same contraction of the laryngeal muscles may be instantly called forth by direct stimulation of one or both of the recurrent nerves. Now, it may with reason be asked, How is it that this constricting action of the phonatory muscles is brought about if it be true that the nerve fibres animating the dilators of the glottis are the stronger and the more numerous? Why should we not get *abduction* of the vocal bands instead of *adduction* on irritating the recurrent nerves? The phonatory muscles are to the respiratory muscles as five to two, and the closure of the glottis has always been ascribed to the superior numerical strength of these constrictors. Yet if we compare, bulk for bulk, the muscular fibres which compose the five muscles of phonation with those of the two respiratory muscles, we do not find that they are much, if any, in excess of the latter, and we venture to think that there is some other factor concerned in this phenomenon apart from mere muscular force. It may be sought, perhaps, in this important difference between the respiratory and the phonatory function of the glottis, namely, that while the respiratory muscles are ever on the alert, holding the glottis open during the entire healthy life of an individual, in his waking as well as in his sleeping hours, the phonatory muscles, on the other hand, are more dependent upon the *consciousness* of the individual in order to respond to any irritation. To explain: The phonatory function of the phonatory muscles could, as far as life is concerned, be dispensed with. Not so their constricting action with the view of excluding the passage of foreign bodies to the lungs. The constrictor muscles of the larynx are the sentinels who guard the approach to these vital organs. But they cease to act if the animal is in profound narcosis; they are asleep, so to speak, on their watch. A man in the condition known as 'dead drunk,' lying, let us suppose, on his back with his mouth open, would offer no obstacle to prevent any living insect that chanced his way from crawling in and out of his mouth, or meandering around in his larynx *à volonté*, without exciting reflex contraction of its muscles. The power of ether, chloroform, and other anæsthetics to impair the action of these constrictors is too well

¹ Klinik d. Krankheiten d. Kehlkopfs, p. 439, Wien, 1866.

known to need mention. To carry this line of thought a little further, should we not expect that, provided we could preserve the organic life of an animal while its volition was at the same time completely abolished—should we not expect, we ask, under these circumstances, to get a dilatation of the glottis on irritating the recurrent nerves instead of a closure, for the posterior crico-arytenoid muscles are muscles of organic life? Indeed we believe we should, and we submit the following experiments in support of that belief."

Dr. Hooper's experiments were performed upon dogs which were etherized, the mouth opened and the tongue drawn out so as to expose the larynx to view. The recurrent nerves were then exposed, cut, and stimulated at will. The results of the experiments apparently confirmed the theory given above, viz., that the constrictor functions of the larynx are dependent upon consciousness. And the conclusions drawn from them may be briefly stated as follows: That stimulation of the recurrent laryngeal nerve always produced abduction of the arytenoid on that side, provided the animal was deeply under ether; that on removing the anæsthetic, the dilatation produced by stimulation became less and less as the animal regained consciousness, until finally contraction of the glottis followed; and that the abduction differed in different dogs. These effects were noticed when the dogs were under morphine, chloral, and chloroform, though not to the same extent as when under ether. In other words, he concludes that the tendency of the glottis is to remain widely open, and that any given stimulus from the recurrent nerve would act upon the abductor muscles alone unless volition came into play, when the stimulus would exert the opposite effect and produce adduction. Such being Hooper's theory and his conclusions, I pass to my own series of experiments, undertaken to test the following points:

First. Is it true that the constrictors cease to act during profound narcosis, or when consciousness is suspended from any cause?

Second. Do we, as Hooper says, always get abduction of the arytenoids (dilatation of the glottis) on stimulation of the recurrent nerves, when consciousness is suspended?

EXPERIMENT I.—Medium-sized dog, under small dose of morphia. Slight movement of the glottis during quiet breathing. Recurrents exposed; stimulation of the right nerve produced complete adduction of that cord, and slight adduction of the opposite one. The same result followed stimulation of the left recurrent. The nerves were stimulated from time to time for an hour or more, with the same result. The animal now began to come from under the narcotic, and it was therefore tracheotomized, and ether given, and while there was still considerable movement of the glottis upon stimulation of right and left recurrent, I thought I noticed a slight *abduction* on the side stimulated, but in a few minutes, when the animal was deeply under the anæsthetic, and all movement of the larynx had ceased, stimulation of both recurrents separately produced a complete closure of the glottis. I am inclined to think, therefore, that the first apparent abduction was the result simply of the normal movement of the vocal cords in inspiration. In order now to do away with any possible movement of the larynx, the animal was

made completely apnoëic, and the right recurrent nerve cut, on stimulation marked adduction was observed; the other nerve was now cut, and stimulation again produced adduction.

EXPERIMENT II.—Large dog, deeply under ether and chloroform. Stimulation of the right recurrent produced marked adduction. This nerve was now cut, and the left nerve stimulated, when marked adduction was produced. The right nerve was now traced to its final division, and the branches going to the posterior arytenoid, and those going to the other muscles, were tied and cut. Stimulation of the inferior or crico-arytenoid branch produced marked abduction, dragging the cartilage completely to the side. On the other hand, stimulation of the superior branch produced complete closure of the glottis, as was expected. Stimulation, however, of the branches simultaneously invariably produced adduction. These results were obtained over and over again. The dog meanwhile being profoundly anæsthetized, and the nerves being thus separate, I thought it would be well to see if I could get any proof of the fact, stated by clinicians, that the abductor nerve fibres were prone to injury and disease. And though the two nerves were exposed and cut for the space of an hour and a half, I could find no difference in their action; they responded equally to stimulation. That all possible consciousness might be done away with, the dog was bled to death; stimulation of either recurrent invariably produced adduction.

EXPERIMENT III.—Medium-sized dog, under morphia. Nerve dissected out to final distribution; stimulation resulted as in former experiment. Thinking now that the kind of stimulation might make some difference, a crystal of sodium chloride was placed upon the left nerve. The cord was alternately abducted and adducted as different fibres of the nerve were affected by the salt, though the general result was rather one of adduction. The result of pinching the nerve was, generally speaking, adduction.

EXPERIMENT IV.—Fair-sized dog, somewhat under morphia, later profoundly under ether. Right recurrent stimulated and adduction followed. The nerve was cut and adduction again resulted; there were no appreciable movements of the larynx at this time. The left recurrent, uncut, was now stimulated and adduction resulted. The latter nerve was cut and stimulation invariably gave adduction. Stimulation by pinching produced adduction. After the nerve had been somewhat injured it was stimulated below the point of injury to see whether one or the other fibres might have degenerated more rapidly, but adduction again resulted.

EXPERIMENT V.—Fair-sized dog, under ether only. The nerves were not stimulated until the animal was profoundly narcotized and all movement of the glottis had ceased, when stimulation of either nerve, cut and uncut, always produced adduction. The dog was killed and after some minutes adduction was produced on stimulation. The strength of the current in all these experiments was always considerable, the induction coil being at about 10. In this series of five experiments under no condition had abduction of either cord been obtained, as Dr. Hooper had found. Now Dr. Hooper's results, seen by Dr. Bowditch and himself, must have existed, and so I was put to it to account for the great diversity in my own results. The experiments up to this point had been performed under like conditions, and sources of error excluded as far as possible. The next experiment was carried on with the utmost

care and with unexpected results. In the experiments given above the induction coil was at 10, giving always a strong stimulus.

EXPERIMENT VI.—Medium-sized dog, under ether. Professor Martin having suggested that possibly the results obtained by Hooper were reflex (both Burkhard and Hermann stating that the recurrent had sensory as well as motor fibres), the right recurrent was stimulated uncut, but with the usual result, adduction.

Though the animal was deeply narcotized there were still some movements of the glottis, and to do away with these the dog was accordingly made deeply apnœic. Under this condition it was observed that the cords came nearer together than in normal breathing, which is what might be expected; no impulses proceeding in this condition from the respiratory centre. The nerve was now stimulated and adduction was strongly marked. The right nerve was cut and stimulated, but with the same result. That all possible respiratory movements might be done away with and consciousness entirely removed, the medulla was destroyed and artificial respiration kept up. The right nerve was now cut, the induction coil was moved out and the stimulus made very weak (more by accident than intent), when, much to our surprise, *abduction*, distinct and prolonged, resulted. The stimulus was gradually increased, with the same result, until the coil stopped at 16, when *adduction* of the cord took place. This result was obtained again and again on stimulation of either nerve. Here then, at last, we had the result obtained by Hooper. All consciousness in this case had been suspended. Was the abduction, then, as Hooper declares, dependent upon unconsciousness and loss of volition? Hitherto we had obtained *adduction* under all circumstances, with the animal slightly, deeply, and entirely narcotized, and indeed when dead. Was not this abduction, just obtained, dependent upon the strength of the stimulus? Was not the abduction due rather to the greater irritability of the abductor muscles which caused them to answer to a much slighter stimulus than the adductor muscles? and was not this what we might expect from the vital importance of the former pair of muscles? Finally, did the abduction depend upon unconsciousness, or would we obtain the same result with volition at work?

EXPERIMENT VII.—Medium-sized dog, under ether only, right recurrent cut, and the animal well though not deeply narcotized; induction coil placed at 35: the stimulus was too weak, however, and no movement was visible. At 34 there was slight abduction of the arytenoid, which became more marked as the stimulus was increased. At 18 the abduction was greatest. At 16 the abduction was slight. At 14 the cord vibrated between abduction and adduction. At 10 adduction was most marked. At this last point slight contact produced a momentary abduction, which movement passed into adduction on full contact and stimulation. The abductor muscles seemed to lose their power and become exhausted upon strong and continued stimulation. The animal by this time had become deeply narcotized. In order to see whether volition would alter the results, the dog was allowed to come almost completely from under the influence of the anæsthetic: reflexes were numerous and marked. The coil was placed at 30, and abduction followed, as indeed it did until the coil reached 12, when a mixed movement resulted, and at 10 adduction followed stimulation. The change in the number at which adduction or abduction followed, may be explained by some exhaustion of the

nerve from continued stimulation. Both the recurrents were now cut, and thinking that the number of stimuli might make a difference, the interruptions were made in turn very slow and very rapid, but with no change in the results as given above. The experiment then confirmed the results of the previous one, and seemed to show that the abductor muscles were much more irritable than the adductors; and that abduction depended in no way upon volition, as the same result was obtained whether the animal was conscious or unconscious.

EXPERIMENT VIII.—Forty-eight hours previous to operation, about one inch of the right recurrent nerve had been excised, with a view to finding which, if either, set of fibres contained in it would degenerate most rapidly. The dog was deeply etherized and the nerve found. The cut end was enveloped in a mass of inflammatory product from which it was freed and its end stimulated. With a feeble current the right cord, which was completely paralyzed, was strongly abducted, as it was indeed upon stimulation with all strengths from weakest to strongest. The animal was now allowed to come from under the ether almost entirely, with not the slightest change in the results, however; under no circumstances was adduction produced. The left nerve was stimulated, and with weak current abduction was obtained; with strong, a mixed movement. It will be noticed that adduction was never obtained from the injured nerve, which would seem entirely to confirm Dr. Hooper's conclusion, that the abductor fibres are the less susceptible, both to disease and to injury. In this case the adductor fibres seemed to have proved the more vulnerable. The dog was now killed, and after a short time on stimulation of the right nerve abduction invariably followed, while on the left side adduction only could be obtained with all strength of stimulus; which fact, I think, is explained by supposing that the more irritable muscle, the posterior crico-arytenoid, dies more rapidly than the less irritable adductors.

EXPERIMENT IX. was confirmatory of previous experiments; abduction depending upon the strength of the stimulus, and abduction and adduction obtained whether the animal was narcotized or not. One fact was impressed upon me by this experiment, viz., that after constant and strong stimulation the abductor muscles became exhausted, and any stimulation, therefore, produces adduction.

Proceeding now to the analysis of these experiments, we find that in the first five under no condition was abduction of either or both cords obtained, except, of course, where, as in Experiments II. and III., the branch of the recurrent going to the posterior arytenoid itself was stimulated. Adduction of the arytenoid was obtained, however deeply the animal was anæsthetized, in all five experiments. In two cases (Experiments II. and VI.) where the animal was made thoroughly apnœic, and where for some seconds there was neither glottic nor respiratory movement, adduction resulted from stimulation. In two cases after the animal was dead, but before death of the nerves or muscles of the larynx, stimulation produced closure of the glottis. Under all these conditions of unconsciousness and narcotism, then, was adduction produced. This result followed, in these experiments, stimulation of the cut and uncut nerve; and followed chemical and mechanical, as well as

electrical, stimulation. Again, in Experiment II., where the separate branches of the recurrent to the individual muscles were dissected out, and stimulated equally, neither showed a tendency to more rapid degeneration than the other.

My conclusions then from this first series of experiments are: 1st. That the constrictor muscles of the larynx *do not cease to act during profound narcosis or during suspension of consciousness* from any cause; or, in other words, that their action is not dependent upon volition, in the sense that they lose their power with the loss of volition. 2d. That we do not always obtain abduction of the arytenoids when consciousness is suspended, as argued by Dr. Hooper. Under what conditions then do we get abduction of the cords upon stimulation of the recurrent nerve? Such conditions must exist, for abduction of the cord has been obtained by Hooper, who considers that suspension of volition is the one condition under which stimulation of the recurrent nerve brings about abduction. What the conditions are under which these abductors act was, I think, partly discovered in the next series of experiments. In them it was found: 1st. That the abduction obtained by Hooper was in no way reflex. 2d. That abduction is in no way dependent upon the unconsciousness of the animal, as held by him. 3d. That it is with weak stimuli only that abduction of the cords takes place, which movement of abduction gradually passes into one of adduction as the strength of the stimulus is increased. 4th. That this result invariably followed, whether the animal was slightly, deeply, or thoroughly narcotized; whether the animal was eupnœic or apnœic, when the dog had his medulla destroyed, and after local death had taken place. 5th. That the rate of stimulation did not affect the general result. 6th. That after strong and constant stimulation the abductor muscles became worn out and ceased to answer to stimuli. 7th. That in apnœa the cords came nearer the middle line, the abductors receiving no stimulus in this condition from the respiratory centre. Here then, I think, we have a suggestion, at least, as to the innervation of the muscles of the larynx. And again we state that volition, consciousness, or unconsciousness in no way affect the action of the laryngeal nerves or muscles. In our first series of experiments *adduction* resulted under all conditions of unconsciousness; in our second series *abduction*, in all conditions of consciousness or deep narcotism: we may, therefore, cast out volition as a factor in our problem. Abduction of the arytenoids was found to depend simply upon the strength (the rate did not change the result) of the stimulus; dilatation of the glottis followed always weak stimulation of the nerve. How is this result then to be explained?

It must remain for subsequent investigations to decide whether this greater irritability is in the nerve fibres or the muscle fibres, but the fact remains that the abductor muscles respond to a much weaker stimulus

than do the adductors. That their irritability is greater, was proved not only by the weaker stimulus to which they responded, but by the fact alluded to in Experiment IX.: that, after continued stimulation the muscle or nerve fibres of the abductors became exhausted and only adduction resulted from stimulation of the nerve. Again, in the several experiments where the nerves were stimulated after death, only adduction after a time could be produced, the more irritable fibres of the abductors dying most rapidly. The apparent contradiction in Experiment VIII., where after section of the right recurrent two days previously, abduction only, under all circumstances and with all strengths of stimuli, was produced, may, I think, be explained by supposing that for some reason the fibres of the adductor muscles had degenerated more rapidly, which fact with others leads me to agree entirely with Dr. Hooper's statement, that he can find no proof of the assertion of the clinicians, that the abductor fibres of the recurrent are prone to disease. This clinical fact may be explained, however, by the theory of the greater irritability of the abductor muscle or nerve fibres. For in cases of bilateral paralysis of the cords from an aneurism or tumor, the constant pressure exerted by either, upon the nerve, acts as a mechanical stimulus to it, and, therefore, the more irritable abductors are the first to show the result of this constant stimulation, by their loss of function. Upon these facts, then, I would explain the innervation of the larynx somewhat as follows: Breathing is an involuntary act, though the diaphragm and all the other muscles employed in respiration are voluntary muscles; and though respiration may be modified within very wide limits by the will, yet we habitually breathe without the intervention of the will. The larynx is an essential part of the respiratory apparatus and is immediately connected with, and must receive impulses from, the respiratory centre in the medulla, and its respiratory function is the most important; for the purpose of preserving life the glottis must be kept open, and so we find that the cords, even in normal breathing, at each inspiration are pulled slightly away from their apparently normal position between extreme abduction and extreme adduction. The fact that in deep narcosis the cords are pulled widely apart, would seem to show that stronger stimuli than usual are proceeding from the respiratory centre to the abductor muscles; for in all deep narcosis the tendency is toward dyspnoea and always in this condition normal respiratory muscles are called into greater play.

The constrictors of the larynx are apparently always in a state of partial tonic contraction, and ready for use at any moment. I found that in every case where the dog was thoroughly apnoeic that the cords came much closer together than in normal breathing; and this, it seems to me, is what we might expect, for in apnoea the respiratory centre is at rest; and the respiratory function of the larynx being for the

moment in abeyance, the protective or constrictor function of that organ asserts itself. Again, it is well known that great changes can be brought about in the respiratory movements by the will; while, on the other hand, the respiratory centre is the one most frequently affected by nervous impulses from various quarters. Is it not fair then to suppose, and I think the above experiments support the supposition, that both the respiratory and constrictor (or protective) functions of the glottis are governed by those laws which govern the rest of the respiratory apparatus?

It is well known that the pneumogastrics contain two kinds of fibres—one accelerating, the other retarding, regulating, or inhibitory. Ordinarily the excitation of the former predominates; for after division of one or both vagi the respiratory rhythm becomes slower. Gentle stimulation of the central end of the divided vagus produces acceleration of the respiration; if, however, the stimulation is made strong, the action of the diaphragm is stopped—it is in a state of relaxation or expiration; this is particularly the case in the fatigue of the nerves; the result being due to the fact that the inhibitory fibres do not become so quickly exhausted as the accelerators. (Burkhard.)

The larynx, then, as we have said, being part of the general respiratory apparatus, its inspiratory and expiratory (constricting) functions are under the same nerve control as the rest of the organs concerned in inspiration, and under no circumstances are these functions suspended.

The action of the constrictor muscles is second only in importance to that of the dilator muscles, and we do not think, in view of the results obtained above, nor upon general principles, that nature would allow (as held by Dr. Hooper) so important a function to be suspended; and, indeed, we found that even in the deepest narcosis closure of the glottis followed irritation of the interior of the larynx.

There seems to be a similarity between the nerve fibres of the recurrent and those of the pneumogastric, and, on the whole, we are inclined to think that the great irritability mentioned above is in the nerve fibres supplying the abductors; the two sets of fibres of the recurrent supply opposite sets of muscles, and may be likened to the two kinds of nerve fibres composing the pneumogastric—the one answering to less, the other to stronger stimuli.

Again, it seems to me that the abductor muscles are the more irritable, and are always ready to perform their part in the human economy; that the adductor muscles, on the other hand, are less irritable, but none the less ready, in consciousness or unconsciousness, to perform their function. It is a physiological fact that impulses from almost every sentient surface, or passing along almost every sensory nerve, may modify the respiratory movements in one direction or the other, the slighter, feebler impulses tending to quicken the respiratory discharges; the stronger, larger impulses tending to arrest or inhibit the respiratory discharges from the

medulla; and the movement of the larynx would be in keeping with that of the rest of the respiratory apparatus.

Finally, the constrictors of the larynx, needing a stronger stimulus to bring them into action, find that stronger stimulus in the numerous reflexes which arise upon the introduction of any foreign body into that organ.

My thanks are due to my friend, Professor Martin, both for the use of his laboratory and for valuable help.

NOTES TOWARD THE FORMATION OF CLINICAL GROUPS OF TUMORS.

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(Concluded from page 478.)

IN the preceding parts of my paper, I have insisted upon the importance of trying to construct clinical groups of tumors, taking as one of our chief guides for doing so the special locality from which they spring. A remarkable illustration of the value of this rule has just occurred to me. Eight years ago I published the case of a young lady, a governess, who had a tumor of the palate which presented very peculiar features. It was developed on the left side, just at the junction between the hard and soft palate. It was indolent and quite painless, and although ulcerated in the middle it showed no tendency to fungate or bleed. It was, in fact, quite passive in all its characters. It was almost circular and somewhat larger than a shilling. In its centre there was an ulcer through which the bare bone could be touched. The growth had been slowly increasing, I believe, for about two years. The indolent induration of this growth closely resembled what we sometimes see in a primary syphilitic sore, but the long history put such a diagnosis quite out of the question.

Having never seen anything exactly like this growth, I asked Sir James Paget to be kind enough to look at it, and he agreed with me as to its great rarity, and in thinking that it was advisable to excise it, and, also, in the hope that it was not of a malignant nature. I did the operation very freely, cutting round the base of the growth to the bone, and then detaching with a raspatory. The actual cautery was freely applied to the edges. A portion of bone from the base of the wound subsequently exfoliated, but at the end of six weeks healing was complete. I heard of this lady two years after the operation. She had married and was in excellent health without any signs of return.

During the last three months I have had under care a second case, the exact counterpart of the preceding. The growth was on the same part of the palate. It was hard and bossy, and although presenting a deep ulcer, was entirely devoid of irritability and quite painless. It had been growing for about two years. I excised it freely, taking away the whole thickness of part of the soft palate. The wound has healed well, but as yet only four months have elapsed since the operation.

In neither of these cases was there any gland disease. The subject of the second case was a tradesman from Lancashire, aged about forty-five. A careful microscopic examination of the growth was made in the second case by my eldest son, who reported that it showed evidence of having originated in gland tissue, but did not display the ordinary features of epithelial cancer. We may regard the growth as adenoid in both cases, and as having probably begun in one of the large glands met with in this region. The two cases were, I repeat, exact fac-similes of each other, and I may add that I have never seen growths precisely like them anywhere else.

Amongst the clinical names which I would not willingly lose is that of "wart tumor of cicatrices." No doubt, these tumors do eventually assume the histological characters of epithelial carcinoma, but their history is usually very different. Their differences depend doubtless upon the peculiarities of the tissue in which they take their origin, that tissue being a scar. With rare exceptions, malignant growths in cicatrix do not cause gland disease. They may run a long course and assume very formidable local proportions, but still there is no risk either of gland infection or of internal growths. A knowledge of this fact is of great importance to the surgeon, and may occasionally encourage him to perform radical operations under circumstances otherwise very unhopeful. Even if in connection with the unhealthy state of the ulcer there should be irritation or enlargement of the lymphatics, there is reason to hope that it may subside after removal of the primary disease. All that is necessary in order to predicate these peculiarities of clinical course, is to be certain that the morbid action did really begin in scar tissue. I would be far from asserting that all cancers of scar are exactly alike. On the contrary, it is very possible that they may differ in important features in different kinds of scar. Thus, when cancer begins in the scars left by lupus it has a different course to that which we witness when it begins in the scar of a burn. So also when it begins in a scar which has previously taken on keloid growth (a rare event) it may present peculiarities. When it attacks a lupus scar it usually runs, I believe, a very rapid course. Its career is still, however, a local one. It fungates, ulcerates, and bleeds, but it does not affect the lymphatics.

There is certainly important work to be done in the collection of clinical evidence as to the diseases to which scar tissue of different kinds

is liable. We shall be unwise if we are content to class all malignant diseases of scar as simply epithelial cancer, since we shall fail to indicate, under that name, all the knowledge that we possess. The designation is too comprehensive, yet it is the only one which histology can give us.

I was indebted to Mr. Cæsar Hawkins for having my attention first drawn to the peculiarities of cancer when it begins in scars, and to the fact that it does not cause gland disease. So long ago as 1833, Mr. Hawkins published in the *Medico-Chirurgical Transactions* a series of "Cases of Warty Tumors in Cicatrices," and he resumed the subject again in a clinical lecture in 1837. He insisted strongly respecting such growths that although they may grow freely, fungate, and progress rapidly, yet "that the disease is not in the least malignant, as cancer is malignant, but is, on the contrary, entirely local in its origin, and does not contaminate even the adjacent parts, except in a very trifling degree, so that no future mischief need be apprehended." In several of Mr. Hawkins's cases the scars were of a kind which we now fortunately never see, those, namely, which result from the contused lacerations caused by flogging.

I have adverted to the fact that scars from different causes differ somewhat in their characters, and that probably each special kind of scar stamps its peculiarity on the malignant growth which affects it. As a further illustration of this fact, I may adduce a very peculiar form of epithelial cancer with which I have only recently become acquainted, and which is developed in warty scars in the palm, the consequence of prolonged administration of arsenic. My own experience of this malady comprises only a single case, but in it both palms were affected, and the malignant growth presented the same peculiar features in both. In neither, although the microscope gave the verdict "epithelioma," did the ulcer look at all like what we usually recognize as epithelial cancer. Some of the best authorities who saw the case, and it was seen by many, felt confident that the disease was syphilis, and not cancer. In the end there remained no doubt on this point, and I mention this opinion only in order to emphasize my assertion that the growth did not look like cancer. Its peculiar features, which led to the suspicion of syphilis, were the entire absence of warty growths, and a condition of infiltration of cellular tissue with ulceration of the skin. It may possibly be objected that I have no right to claim this growth as originating in scar. The state of skin which precedes it, and which is caused by arsenic, is, however, really one closely allied to scar. In the first place, little pits are developed in the skin of the palm, and after these have lasted for some time the epidermis at the borders of the pits becomes hard and horny. Next, from the bases of the pits, where the epidermis has been destroyed, growth downward takes place, and the malignant disease is developed. Although some horny thickening of epidermis occurs in parts, yet from

first to last there are no true papillary warts. Whether or not we admit that the disease is cancer of scar, it equally well sustains my contention that it is desirable to construct clinical as well as histological groups of malignant growths, for it differs widely from all other forms of cancer, and its peculiarities are repeated in fac-simile in other examples of the same malady. I have said that the two growths were exactly alike in the two hands of the patient whose case is the only one which I have myself seen. This patient was a New York surgeon, and his case has been very ably recorded by Dr. James White, of that city. Dr. White has also been able to add another case, in which, in association with the same antecedents, an exactly similar growth occurred. The condition of atrophic scarring of the palms from the too prolonged use of arsenic I have myself repeatedly seen. So far as the facts at present go, I believe that they favor the belief that in this form of cancer, as in others developed in scars, there is no affection of the lymphatic glands.

When malignant action attacks the skin of the back or chest it usually runs a course very different from the gland-infecting form of epithelioma, and somewhat different also from the rodent cancer (which does not affect glands). It is certainly more nearly allied to the latter than the former. We do not, however, see it travelling over large surfaces with its wavy semitransparent edge and superficial growth in the manner which we are so familiar with in rodent when it affects the skin of the face. On the chest and back the ulceration extends deeply and is characterized by extremely thick edges. I have seen a huge ulcer with hard edges an inch in thickness, and an area of six inches by three, yet no tendency to fungate, no bleeding, no gland disease, and, on the whole, comparatively slow progress. Almost all the cases of cutaneous cancer in these regions conform to the same type, and this type is seldom or never closely repeated elsewhere. On the limbs we never see any approach to the peculiarities of rodent cancer as seen on the face, or to the deep malignant ulcers which I have just been describing, on the trunk.

I believe that we might say that every part of the skin surface of the body has its own peculiar tendencies, as regards the types of cancerous action which are developed in it. I have already insisted that the rodent ulcer is a disease almost restricted to the face. When anything approaching to it occurs on other parts it always shows special peculiarities. I have just alluded to the deep, huge ulcers which form on the front of the chest and abdomen. Further observation will, I believe, confirm me in the statement that there are distinct features of difference between these and malignant ulcers on the back. I have seen four or five in the latter region which were all exactly alike. Like rodent, they spare the glands; they are as slow in their progress as is rodent of the face, but they assume very different external features. A German lady whom I

am now attending may serve as an example of the local malignant ulcer as met with on the back. She is fifty-four years of age, and the ulcer has been sixteen years in progress. Although very large, it causes her no discomfort, and has not materially injured her health. It is placed exactly in the middle of the line between her shoulders, and is upward of six inches in length by three in breadth. Its edges are dusky and undermined, and more or less ragged. It might, indeed, be taken at first glance for a carbuncle which had recently sloughed. From this, however, the stony hardness of its borders and base at once separates it. It is at least an inch in depth at all parts, but its hollow is crossed by thick seamy bands, and there is a decided tendency to contraction and puckering. There is no evidence of morbid growth excepting the stony induration of the walls of the ulcer. Of the sinuous raised border which characterizes rodent there is not a trace. My patient believed that it began in a mole "which was white, like a strawberry," but this must not be regarded as certain. There is no trace of gland disease, and taking the fact of its very long duration, I have no doubt that it is of the same nature as rodent, being differentiated by its special position, and perhaps by the structure in which it originated. I may assert that all the malignant ulcers which I have seen in this position have been alike in inveterate tendency to prompt recurrence after excision or destruction by escharotics. I have repeatedly used the chloride of zinc paste most freely, but having always been disappointed even of temporary good results, have come to the conclusion that by far the kindest plan is resolutely to let them alone. This remark, of course, does not apply to cases seen in an early stage, but of these none has come under my notice. I have seen no ulcers exactly like these on any other region of the integument.

Our forefathers were fond of the term "parotid tumor," including under it all forms of innocent new growth beginning in or on the parotid gland. Some of these growths are cellular only, and others contain nodules of cartilage. Explain it as we may, the fact is certain that tumors are often seen in this region which run a course somewhat peculiar. The experienced surgeon knows what to predicate concerning the course of a "parotid tumor," and does not expect to encounter similar growths elsewhere. Their slowness, yet persistency of growth, the absence of tendency to skin implication, and the enormous size which they ultimately attain, are their peculiar features. Certainly they do not all begin in the gland. In some cases they appear to overlies it, and as they get heavier show a tendency to travel downward on the neck. I possess a photograph of such a growth which had in the course of twenty years attained a size almost equal to that of the head of the old man who was its possessor. During a recent visit to Glasgow, Dr. Paterson showed me another photograph—of an old woman, if I re-

member rightly—almost an exact repetition of my own case and with a precisely similar history. A patient whom, twenty years ago, I saw in King's College Hospital, under the care of Sir W. Ferguson, presented a third example of this kind of growth. In him also it had slowly increased for more than twenty years. These tumors, which are emphatically innocent, must be carefully discriminated from the rapidly growing masses which I described as frequently originating *under the sterno-mastoid*, and which are of the nature of lympho-sarcoma. I presume that they are of fibro-cellular structure, with perhaps some nodules of cartilage, but I have not had an opportunity for examination after removal in any single case. They are encapsuled and might no doubt easily be removed in an early stage. When very large it is probably wisest to leave them alone. Sir William Ferguson's patient, just referred to, had travelled from India for the operation, and, I believe, died after its performance. On the other hand, there is the well-known case of Hunter's in which a cartilaginous parotid tumor which had been growing fifteen years was successfully removed, although it weighed afterward 144 ounces. Sir James Paget, who has given us much important information as to the structure of parotid growths, states that when they contain cartilage it is often mixed with "other tissues and especially with what appears to be an imperfect or perverted glandular tissue." Most certainly they are not always cartilaginous, and, I think, seldom wholly such, but whatever their structure a slow course may be confidently predicted, and no tendency whatever to implicate other parts. I had recently, at the College of Surgeons, an opportunity of examining a man on whom the late Mr. Phillips and the late Mr. Hilton had each in succession operated for the removal of a parotid tumor. There was an interval of three years between the two operations, and since the last a period of twenty years had elapsed. The man was in good health, but had suffered the inconvenience of complete paralysis of the portio dura ever since the last operation. A point of much interest was that at several different spots near the scar there were small portions of fresh growth which had originated, no doubt, in fragments which had been left behind. None of these had grown to more than the bigness of a nut, and all were of firm fibrous consistence, but probably not cartilaginous.

In the condition of disease known as *molluscum fibrosum*, we have a considerable variety of new growth, and it is, I would submit, to be desired that it may keep its old name, rather than be merged in some wide histological group, and rechristened accordingly. The name now in use applies to the total of products which we meet with in the malady in question. Part of the disease consists in the formation of fibro-fatty masses under the skin (possibly abortive gland tissue); these may vary much in size, and may dip deeply or rise forward and become pedunculated. Over these, but quite distinct from them, in many parts are

enlarged sebaceous glands with sebaceous plugs. Another part of the disease, which is never omitted, is the formation of little pedunculated cutaneous pouches which contain no solid growth, and a third and much less common element is papillary hypertrophy. Although never noticed at birth, the very early development of the several morbid conditions proves conclusively that the tendency, probably the tumor germs, is present congenitally. In addition to the conditions mentioned, various secondary changes allied to tumor growth may be observed in this form of molluscum, especially when its masses become pendulous.

Possibly in near alliance with molluscum fibrosum we have the examples of multiple fibro-fatty tumors of the extremities. These are most commonly seen on the upper extremities, and are arranged symmetrically. They are often seen in young men, but never, I think, in children, and are very rare in women. There is not such strong evidence as regards congenital proclivity, as in the case of molluscum fibrosum, still the probability is great. Like the latter, there appears to be some law of limited growth, for they never, I think, get beyond a certain size. These tumors are seen occasionally in the thighs, more rarely still on the legs, and very seldom on the trunk, neck, and head. They afford, I think, a good instance of the liability of certain regions of the body to special kinds of new growth.

Some years ago I had occasion to remove the entire tongue of a medical student on account of a tumor which had very slowly developed in its substance, and had finally attained a very large size. It was probably an example of lympho-sarcoma, for, although he enjoyed good health for two years after the operation, at the end of the period it appeared on the floor of the mouth, grew very rapidly, and caused death. My reason for mentioning the case here is because this growth had been attended by a very peculiar condition of papillary hypertrophy on the surface of the tongue. Now the kind of hypertrophy alluded to is not very uncommon, and it is, in some cases, congenital. It does not always lead to anything of the nature of lympho-sarcoma, but, I believe that, if not removed in early life, it does usually to some form of tumor growth. The cases are too rare to permit of any very confident statements, but they are sufficient to justify the acceptance in our clinical nosologies of a congenital tumor of the tongue, which sometimes manifests aggressive tendencies. It is the sameness in origin rather than the tissue peculiarities of the final result in an individual case which should guide us in naming and classifying such growths.

The diseases known as keloid and lupus scarcely rank as tumors, but they both of them afford such excellent examples of the influence of locality in giving peculiarity to morbid growths that I can scarcely omit their mention. If we wish to see typical specimens of the spurred keloid, such as Alibert first described, we must seek it where he observed it, on

the skin of the chest. Not but that fairly well characterized keloid growths may be seen in many other parts, but nowhere else does it so fully develop its peculiarities. In many others it is distinctly different. On the face it is very rarely seen, on the back of the neck it may attain great thickness, but is seldom very hard; in the lobule of the ear it is not hard at all, but merely a firm, flabby solid. On the hands and feet it is perhaps never seen, and on the legs and arms it is rare, and never so hard as when on the chest or back. Lupus exemplifies, in a parallel manner, the influence of locality in conferring peculiarities. Note the ease with which a complete cure is effected on the arms and legs, as compared with the nose and face. On the hands and feet nothing that is usually recognized as lupus ever occurs, but in its place a sort of inflammatory papillary hypertrophy. The flat, non-ulcerated patch, with its thick layer of semitransparent apple-jelly-like tissue, so common on the cheeks, is never seen on the hands and feet. Yet that the ulcerations with papillary hypertrophy, to which I have just referred as occurring in the hands and feet, are really lupus, is proved by their frequent coincidence with lupus of unmistakable type on other parts.

In concluding this paper, I wish to make it clear that my object has not been to undervalue in any degree the labors of histologists, but rather to urge that clinical observers may find useful work in their own special field. I have tried to show that by careful case-collecting and the selection and grouping of cases, which, as regards locality, cause, and general course, are really alike, we may hope to construct, on a natural basis, clinical families much more minutely subdivided than is as yet possible to the microscopist.

CHRONIC HYPERPLASIA OF THE ORAL MUCOSA, WITH CORNIFICATION OF ITS EPITHELIUM.

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SYNONYMES: *ichthyosis linguæ* (S. Plumbe, 1837; Hulke, 1861); *plaques des fumeurs* (Buzenet, 1858); *tylosis* (Ullmann, 1858); *keratosis* (Kaposi, 1866); *psoriasis buccal* (Bazin, 1868); *papilloma* or *tylosis* (F. Clarke, 1873); *leukoplakia buccalis* (Schwimmer, 1877); *leucoma* (Hutchinson, 1883; Butlin, 1885); *opaline plaques* of professional glassblowers (Guinard, A. Clarke); *plaques nacrées commissuraires* (Fournier); *chronic epithelial stomatitis* (E. Besnier).

This formidable array of names refers to a group of closely allied

affections that have only been recognized as distinct morbid conditions within the past twenty-five years, although evidently referred to in one form by Samuel Plumbe, in his treatise on *Diseases of the Skin*, published in 1837, in which he stated that he had observed an abnormal development of the papillæ of the tongue in a healthy man, which he regarded as precisely similar to ichthyosis of the skin. But Hulke, in 1861, appears first to have drawn attention to this special form by the report of a case upon which he operated and of which he made a minute study. This elicited a description of other cases and led to a careful study of this and allied affections, by a number of surgeons and dermatologists. The result of this combined research has not been to clear up wholly the mystery in which the disorders have been enveloped from the first, and considerable differences of opinion still exist among authorities regarding their true character.

I have ventured to include all the synonymes under a descriptive title which briefly sums up, according to Ziegler, the pathological anatomy of the affections, or at least of the leading varieties, those especially that tend to run into epithelioma. A name to apply generally is difficult to select, as there appear to be several forms of the disease differing in their clinical and histological appearances and responding differently to treatment, but all agreeing in being very chronic and no doubt bearing a close relationship to each other. It will be seen, further on, that there are grounds for recognizing at least three varieties of the disease and possibly a fourth, to each of which a separate name might with propriety be retained from the foregoing list.

The disease, in general, is characterized by the appearance of patches and streaks or raised areas, on the lingual or buccal epithelium, of a whitish, bluish, or yellowish color in different cases, and ranging in consistency from that of a piece of wet kid leather to that of cartilage. It begins very insidiously, and its early stages generally pass unnoticed by the absence of severe subjective symptoms. After the development of the first patches new ones frequently form, and it is the evolution of these which has been chiefly studied. The earliest morbid appearance, according to Schwimmer, is a red spot due to hyperæmia of the superficial bed of the mucous membrane; on the tongue this red spot is usually studded with granulations the size of a pin's head, due to the tumefaction of the fungiform papillæ. In this stage, which may last for several months, the implicated epithelium is not altered, but gradually its vitality is modified, it thickens, hardens, and changes in color, passing successively from bluish-white to grayish- and silvery-white in spots the size of a grain of wheat, which spread and become confluent, forming the spot or patch that generally comes under the notice of the surgeon. These changes take place very slowly. Schwimmer says that so long as the lesion is progressive it is surrounded by a narrow hyperæmic border,

which disappearing, the extension of the plaque is momentarily or definitely arrested.

If seen at its early stage, well-directed treatment generally removes the disease, but unfortunately attention is not usually called to it until it has lasted for some time and become more or less confirmed. In one form (ichthyosis), the patches are in the form of a thick, fibrous, pearly-white covering on the tongue, upon which may be seen lines and striæ forming polygonal spaces. Ultimately these lines may become fissures, which suppurate and become very painful. Another form (psoriasis) is characterized by an occasional peeling off or desquamation of the involved epithelium, leaving bare, ulcer-like spaces which, later on, are again covered over by altered epithelium. All forms of the disease are very chronic: any one form may remain stationary, or slowly progress, and in a certain percentage of cases the tendency is to malignancy, epithelioma making its appearance at some point of the affected area, and running its fatal course with the same rapidity as when brought about by other causes.

This oral disease, in its pathological nature, is unquestionably related to psoriasis, ichthyosis, and verruca. The clinical features of one form are so similar to those of external ichthyosis as to justify the adoption of that name; of another, the minute anatomy resembles so strongly cutaneous psoriasis that Bazin applied that name to the lingual disease, it seems, with entire propriety. Ziegler¹ classes this group of affections among the hypertrophies. Debove² is inclined to regard the condition as one of cirrhosis. Fairlie Clarke regards its essential nature as a chronic inflammation. The initial state expresses no doubt a low grade of inflammation, while the more advanced condition is more probably a hypertrophy.

Let us consider briefly the histological characters of the affections, contrasting them with those of the kindred disorders of the skin. Debove, whose brochure is based on a study of twenty-four cases, made microscopic examination of the diseased parts of two canceroidal cases, one of the tongue and one of the cheek. The tissues were taken some distance from the cancerous deposit, but are supposed to have shown changes due to this sequel or complication. He regarded the change as a cirrhosis of the lingual mucosa; it was found thickened, indurated, and gritty to the knife, with thickening of the epithelium; here and there the nucleolus of the vesicular cells was dilated, and the corium four or five times thicker than normal, owing to the presence of dense connective tissue. He found a flattening of the papillæ, which caused them to resemble those of the skin, a dilatation of the vessels and an accumulation of leucocytes around their calibre. Butlin (p. 148), in opposition

¹ Patholog. Anat., vol. ii. p. 240.

² Le Psoriasis buccal. Paris, 1873, pp. 54.

to the views of the majority of other observers, believes the epithelium to be thinner than normal.

Schwimmer and Bazin examined specimens taken from the mouths of living patients before the onset of malignant symptoms. These authors found the fundamental lesion to be an infiltration of young cells in the superficial layers of the corium and the top of the papillomatous layer. The hyperplasia succeeding the hyperæmia was particularly marked around the vessels which appeared to be the starting-point of the alteration. The diapedesis of white blood-globules and the proliferation of connective tissue cells were equally active. The papillæ preserved their individuality, if the process was a mild one; if not, at a more advanced stage they became indistinct and were lost in the surrounding tissues—a change denoting the conversion of a benign to a malignant action.

In these descriptions it appears that the pathological anatomy of psoriasis is more nearly described than that of any other cutaneous disease, and the analogy is still further borne out by the termination of external psoriasis in epithelioma occasionally by precisely the same steps of transition as observed in lingual psoriasis. Dr. J. C. White, of Boston, stated before the American Dermatological Association, at a recent meeting, that he had witnessed three cases of cutaneous psoriasis terminate in epithelioma, one of which he had previously fully reported, with comments, in the *AMERICAN JOURNAL OF THE MEDICAL SCIENCES* for January, 1885. Dr. K. Schuchardtt, in his essay on the "Origin of Cancer,"¹ reports four cases of *psoriasis* of the tongue and mouth which terminated in carcinoma; three were inveterate smokers. In a syphilitic subject presenting a similar condition, cancer did not appear. In another case epithelial cancer developed from a psoriasis preputialis of six months' standing. Microscopically the mucous membrane affected by psoriasis showed inflammatory infiltration of the superior layers of the corium, and in the epithelium were numerous nuclei in a state of active proliferation. The application of Paquelin's cautery is especially recommended by Dr. Schuchardtt as a remedial measure. Case VI. of Weir's cases, given in his interesting paper entitled "Ichthyosis of the Tongue and Vulva," in the *New York Medical Journal* of March, 1875, was that of a man seen by Dr. Keyes at Hardy's clinic in Paris, who was affected with general simple non-syphilitic psoriasis; a whitened strip about one-half inch wide was seen crossing the dorsum of the tongue obliquely to its long axis. It was considered by Hardy as part of the general eruption, and disappeared with it. Case X. of the same series, a psoriatic patient, with the characteristic patches on the tongue and buccal surface, was cured by arsenic. Mr. J. Hutchinson has described several cases of lichen-psoriasis of the tongue, which seem to correspond

¹ Sammlung klin. Vortr., 257.

in appearance to the psoriasis of Bazin, at first punctate, and forming a patch by confluence. These are much benefited by arsenic. From these observations it certainly appears that a belief in the existence of oral psoriasis is perfectly legitimate.

W. Fairlie Clarke¹ found some increase in the thickness of the epithelial layer, some enlargement of the papillæ, and a great development of the rete mucosum. Around the bases of the papillæ and the submucous and muscular tissues there was very abundant nuclear cell growth. There was also a notable increase in the number and size of the bloodvessels of the parts. He illustrated his remarks by mounted microscopic specimens. Henry Morris² believes the disease to be like ichthyosis elsewhere; he has seen it on the tongue, while the neck was similarly affected.

Hulke³ found the disease he observed, and named ichthyosis of the tongue, to consist essentially in hypertrophy of the epithelial and papillary elements, resembling precisely in its minute anatomy the cutaneous disease of the same name. Plumbe also found the disease, as he observed it, an almost perfect counterpart of cutaneous ichthyosis, with its epithelial proliferation and overgrowth of papillæ; so prominent are these latter that they have been characterized as resembling those of the tongue of a cat. (Vidal.)

It therefore appears that this form may be regarded as a variety of localized ichthyosis, and its transition to malignancy may be due to its peculiar location. To my mind, the reasons for retaining the term are more weighty than those which have been advanced for its rejection.

A milder form of the disease is called by Butlin⁴ "smoker's patch," and its more advanced stage, leucoma. For this variety, however, I prefer Schwimmer's term, "leukoplakia buccalis," as it locates the lesion, describes its appearance, and does not name another disease; moreover, the disease does not necessarily depend upon smoking; it is rather the expression of an irritant acting upon a sensitive mucous membrane. I have observed in all cases of hyperæsthesia of the mouth and lips a thin, sensitive, external skin, with a tendency to congestion of the capillaries. All food of a hot or stimulating character, tobacco smoke, or alcohol, in such cases, excites a burning sensation of the tongue and roof of the mouth, which is apt to persist for some minutes. Acids appear to aggravate this tendency, and alkalies to relieve it. This, I take it, is the predisposing condition to this affection.

There is still another form of buccal plaque which authors have and still regard as belonging to the class of affections we are describing, namely, the buccal lesions of tertiary syphilis; but in my opinion they

¹ Med. Times and Gazette, March 21, 1874, pp. 331, 332.

² Quart. Journ. Mic. Sci., 1875, p. 97.

⁴ Diseases of the Tongue, 1885, p. 127.

³ Med. Times and Gazette, 1865.

should be classed altogether separately, as the disease in question is idiopathic, wholly independent of a constitutional virus, is different in its physical appearance and in its behavior, and is not in the least benefited by specific treatment. Notwithstanding these facts, authors persist in ascribing to syphilis the power of causing true leukoplakia buccalis, and Kaposi goes so far as to make the mistaken assertion that this disease, which he styled keratosis, always has a specific background following the opaline plaques of secondary syphilis. The error of this view has been abundantly demonstrated, and the tendency of opinion is more and more toward a disbelief in the action of a specific cause in any undoubted case. When occurring in connection with advanced syphilis it is an expression simply of debility, not of the constitutional taint.

It may not always be perfectly easy in all cases to differentiate between the oral manifestations of syphilis and idiopathic leukoplakia or ichthyosis, but a correct conclusion can be generally reached by observing that the specific lesion is the less obstinate and the more painful of the two; but the question can be definitely settled, as a rule, by the therapeutic test. Iodide of potassium and the mercurials aggravate the genuine, but cure the specific disease.

Two other kinds of patches in the mouth may be encountered, which, although not strictly belonging to this class, may be mentioned. The action of amalgam fillings in the teeth, when coming in contact with the mucous membrane, may cause a whitish aphthous-looking patch from epithelial thickening and erosion. This is not leukoplakia, but might become so in a person predisposed. Persons who are subject to squamous eczema occasionally suffer with peculiar scaly and excoriated patches on the tongue. This affection occurs almost exclusively in chlorotic women, and becomes aggravated at each menstrual epoch (Keyes).

Leukoplakia buccalis, and its allied disorders, are very rare. According to Schwimmer, their relative frequency is 1 in 250 affections of the skin. They are unknown in childhood and infancy, but occur most frequently between the ages of thirty and fifty. Henry Morris gives the extreme ages at which any form has been observed, as twenty-two and sixty-seven. Women are almost exempt. Debove did not encounter a single case among them in twenty-four cases; but a few cases are mentioned by other authors, three of which were complicated by the disease affecting the vulva. One of these cases was reported by Weir, one by Vidal, and one by Schwimmer.

The etiology of these oral affections differs in different persons; in some, as has been shown, the mucous disease is simply an extension of the cutaneous, and being part of the latter, yields to the treatment that benefits it. Again, I believe it is possible for a psoriatic or ichthyotic diathesis to declare itself in the mouth, and the other parts of the body to remain free. As a rule, no tendency to cutaneous eruptions is observable

in persons who become the victims of either of these affections, but a sensitive buccal and lingual covering is the predisposing condition, and the local action of irritation the exciting cause; that local irritation may be alcohol drinking, tobacco smoking, hot or peppery food, forcible and repeated compression of the cheeks against the teeth or other hard substance, or, in fact, irritation from any source whatever, if long enough continued.

Most writers believe that the abuse of tobacco is the common exciting cause, but when we reflect that nearly all men smoke, and very few suffer from any of these affections, and that quite a respectable number of cases are on record, occurring in men and women who had never used tobacco, and in whom the disease arose apparently from a constitutional predisposition only, the action of tobacco smoke as a cause becomes less prominent, although in some cases—possibly the majority of a certain form—it is undeniably the irritant which excites the diseased action. The obscurity as to cause and nature has arisen largely, no doubt, from confounding two or three allied but distinct affections. A buccal and cutaneous eruption occurring and disappearing simultaneously, I should be inclined to regard as identical, or a buccal lesion occurring independently and presenting the scaliness of psoriasis and yielding to arsenic, I should certainly regard as a psoriatic manifestation. There is, however, a form of the disease which does not present the gross characters of psoriasis, ichthyosis, or any external skin disease, occurring in persons with perfectly clear skins and no taint of syphilis, which does not yield to constitutional or local treatment. This may be caused by smoking to excess, and, as Butlin says, will recover if the inculpatd cause be discontinued early; if the local irritant be continued long enough, the disease becomes confirmed, the histological changes occur which are persistent and intractable, and may yield to no known treatment except, in favorable cases, to excision or the actual cautery. In this form, as perhaps in most forms, the mucous membrane of the tongue and mouth is more than usually delicate and sensitive; objectively there may be no special evidence of this, but subjectively there is, the person so provided by nature finding that smoking even the mildest kind of tobacco will cause a burning or biting sensation of the tongue, and hot food cannot be eaten with the same impunity as it can by other persons.

Lastly, a disordered condition of the digestive apparatus may furnish a helping hand in bringing about this intractable disorder; at all events, after the affection is established it is noticeably aggravated by digestive and biliary derangements.

In *treatment* much depends upon the stage and form of the disease, for, as intimated, the diathetic forms and the early stages of the idiopathic variety are the more likely cases to be cured by treatment. If we find that we have to deal with a gouty manifestation, colchicum and the

alkalies must obviously be our main dependence; if the disease appears in a person much debilitated from any cause, the cause must be sought and treated; if a cutaneous eruption coexists, our remedies should be addressed to it as the probable *fons et origo mali*. If no such indication can be found, we may feel pretty confident that constitutional measures will avail but little, if at all. Authorities do not all agree that the affection in its confirmed idiopathic form is incurable, but such is the general opinion, and the main reliance is upon topical measures. In the exact use and kind of local applications there is some diversity of opinion, but upon one point all agree, namely, *in avoiding escharotic and irritant applications*. All experience goes to show that caustics increase the tendency to a cancerous transformation.

Hillairet, of Paris, found some alleviation to result from the application of chromic acid (1 : 8) repeated for three days in succession and subsequently at greater intervals. He recommended also rinsing the mouth frequently with Vichy water.¹

Butlin² regards the confirmed disease in any of its forms, incurable. Palliation by local means is all he admits as possible; this he finds best accomplished by a wash containing to each ounce of distilled water either fifteen grains of bicarbonate of potassium, two grains of chromic acid, or one grain of bicyanide of mercury, the latter preferably when the disease is modified by the syphilitic poison. Weak solutions of borax, alum, or common salt he finds of advantage in some cases. The mel boracis he thinks best for sore places. The use of the knife he limits to thick and circumscribed patches, warty growths, and ulcers that are obstinate or show any induration about their bases. These he regards as young cancers, and their removal at this early period as the only mode of saving the patient from subsequently acquiring fully developed and incurable carcinoma.

Schwimmer,³ as already stated, believes in the thorough curability of the disease during its erythematous stage, and is also hopeful by persistent treatment of dissipating well-marked whitish plaques of thickening. His treatment, as described by himself, does not offer anything specially new. Soothing alkaline washes, very weak chromic acid, and sublimate solutions gave the best results. Strong applications were in general unfavorable; the temporary palliation produced by a strong solution of nitrate of silver did not last, but ultimately tended to aggravate the disease. Soothing remedies gave permanent benefit and, he thinks, prevented, in some of his cases, a change to malignancy.

Weir, of New York, in a note to the writer, states that in the treatment of ichthyosis linguæ he has practised excision, scraping under the

¹ Trans. of the Seventh Int. Med. Cong., vol. iii. p. 173, 1881.

² Op. cit., pp. 152 et seq.

³ Die idiopathischen Schleimhautplaque der Mundhöhle (leukoplakia buccalis), Vierteljahresschr. für Derm. und Syph., 1877, p. 511; 1878, p. 53.

influence of cocaine, and the destruction of the patch by a strong solution of chromic acid (60–100 gr. ad ʒj). When it has lasted for some time, and there is any appreciable thickening, he considers excision or scraping with a sharp spoon as the best measure.

Ashhurst (personal communication) advocates the let-alone policy in all cases not admitting of excision.

Heath,¹ in his brief but suggestive account of these affections, describes a form of chronic glossitis which, he says, may be caused by stimulating food or drink, by over-use of tobacco, by syphilis, or by the prolonged ingestion of mercurials. Besides the tongue, it may also attack the cheeks. If unchecked, patches may form which peel off from time to time and constitute the so-called *psoriasis linguae*. If still unchecked, a more confirmed and serious disorder follows, characterized by the formation of permanent whitish patches. This is *leukoplakia* or *leucoma*. This may pass into cancer. Still more serious is the disease known as *ichthyosis of the tongue*—possibly a later link in the chain of evolution, but more probably occurring *de novo*. Of this form, it is believed that it will run with absolute certainty into epithelioma if left to its own evolution. He also refers to Hutchinson's description of patches on the tongue and cheeks in association with external psoriasis and pityriasis.

We have here a suggestion for an orderly nomenclature and a clearing up of the confusion that has hitherto existed, resulting from the attempt to explain a group of morbid conditions under a single name, and that name a different one with different authors.

My clinical experience with these disorders is limited to five cases, all of the idiopathic form—all males—two in the erythematous stage, and three in the stage of whitish plaques. The two former were benefited by local treatment and changed habits, and soon passed from under my care. Of the three latter, one was in the person of an enlisted man of the army, who came only once to my office. On the left side of his tongue was a scar which had existed for many years and around which a whitish alteration of the epithelium alternated with a reddish and painful condition of the mucous membrane (psoriasis). This he had observed for several years. At the time I examined it, it was the seat of some soreness. I directed him to paint it several times a day with the mel sod. borat. He denied ever having had syphilis, but used tobacco to excess, as the odor about his person testified. He had also been a hard drinker, but had reformed some months before. The second case is that of a gentleman who has been under my care for about one year. He is a moderate smoker and temperate in the use of liquors, and has never had syphilis. The right side of his tongue is affected, and he appears to be of a gouty diathesis. Alkalies and colchicum inter-

¹ Internat. Ency. Surg., vol. v. pp. 50 et seq.

nally and alkalies locally have eased him, but his case now remains about stationary, occasionally bothering him and again giving him no uneasiness. The third case I have had under constant observation for over two years. It is one of marked leukoplakia of both cheeks, the tongue being wholly uninvolved. Soon after the patient first discovered the patches, and before applying for treatment, he touched a part of the affected area with nitrate of silver. This place is the only one which now seems incapable of being resolved. The other portions have slowly improved under treatment, and I am hopeful will, in the course of time, return to the normal condition. This patient is wholly free from syphilis. He formerly smoked moderately, but wholly abandoned the habit two years ago. He also used liquors abstemiously, but now rarely, and medicinally if at all.

The cure of any well-marked case is, to say the least, of doubtful attainment, but I would submit the following line of treatment as that which my experience and research persuade me to be the most likely to secure that end:

1. Idiopathic and irritative patches, usually expressive of debility, require a restorative regimen and tonic treatment. The use of tobacco in all forms should be discontinued as much on account of its general as its local effect. Alcohol should be interdicted, or used with caution, as nothing can be much worse in its local action upon the disease even when very much diluted, and I believe its general action to be, in the main, unfavorable. Debove regards the morbid change he observed as identical with cirrhosis; how much alcohol may have been concerned in its production we can only surmise—that it perpetuates and aggravates it I am convinced. All stimulating articles of food, ginger, pepper, mustard, carbonic acid waters, hot liquids, hot solids, etc., must be avoided. Cold does much less harm than heat, and ice cream, etc., can, as a rule, be eaten without injury. The general health should be brought up to as high a standard as possible by good food, regularly eaten, suitable exercise, frequent bathing, and sufficient sleep. General medication should simply be directed toward improving the general health, and topical applications need only look to keeping the buccal secretions in good condition. This treatment also answers for the disease when engrafted upon the anæmic condition of late syphilis, or that arising from prolonged use of mercurials. It is, however, always independent of specific poison, and must be treated accordingly.

2. Well-marked patches of *leukoplakia* should be treated in the same way, but we may in addition use weak chromic acid solutions as directed by Butlin, advancing by slow degrees to the strength advocated by Hillairet and Weir if necessary. This should be done with caution, as strong applications are in general unfavorable. In addition, it will be perfectly legitimate, I believe, to resort to the constitutional use of

arsenic, at first in tonic doses and afterward carrying it to the point of toleration, if necessary, and not otherwise contraindicated. Its thorough dilution should be directed, as otherwise it may do harm locally by its acidity. Weak alkaline washes should be occasionally used, once or twice daily, and it is important that the soothing and restorative plan of treatment be followed for years, if necessary.

3. Ichthyosis of the tongue seems to occur in perfectly healthy and robust men, and in its treatment the question of vital repair may not be one of so much importance. If the patch is not too thick, it may be first brushed with chromic acid solution, 1:8, or if not likely to be benefited by that application it may be curetted. But, as laid down by Heath, its thorough removal is necessary and, when clearly diagnosed, there is no question as to the proper course to take; it should be entirely removed by surgical means—the galvanocautery, the sharp spoon, or the knife, for otherwise its transformation into cancer is only a question of time.

4. As the localization of eczema, psoriasis, lichen, pityriasis, etc., on the tongue or inside the cheeks appears to be possible, it is well to bear this in mind, and if a coincident cutaneous eruption is found it may aid us in reaching a diagnosis.

Finally, an important question is, What cases are likely to undergo the epitheliomatous transformation? All writers agree that *ichthyosis lingue*, whether limited or extensive, is a precancerous condition. Leukoplakia affecting the tongue is also a forerunner of cancer only a little less certain than ichthyosis; when seated on the mucous lining of the cheeks or lips, Debove is of the opinion that it is less apt to display malignancy, but Verneuil and Debove each cite one case of cancer following its localization on the cheek, and Bassenreau one case in which the lip was the seat. *Psoriasis*, as defined by Heath, when properly treated may remain benign or undergo a cure, and hence is less apt to pass into cancer, but if neglected will probably do so.

The so-called “smoker’s patch,” or “smoker’s glossitis,” or the erythema of irritation, being the first discoverable morbid state, is usually curable by proper treatment, and hence does not express the menace that the other forms do.

Weir thinks that the malignant tendency in any form is directly as the epithelial thickening. But simple irritation of the mouth, as of the skin elsewhere, if long enough continued, may eventually terminate in epithelioma.

THE FUNCTIONS OF THE MEMBRANA TYMPANI ILLUSTRATED
BY DISEASE.

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THE two following considerations will show that our knowledge of the functions of the membrana tympani may be added to by the observation of this structure when it becomes altered by disease.¹

1st. *Structural changes in the tympanic membrane of a very extensive nature may exist without impaired hearing.*

This is shown by examples, in which, after as much as one-half, and sometimes more, of its area is occupied with calcareous deposit (phosphate of lime) embedded in its substance, the hearing power remains quite normal. With this deposit the membrane is three or four times thicker than usual.

Inasmuch however, as a certain proportion of individuals, who are the subjects of this condition, have imperfect hearing, it is a fair presumption that in these latter examples the loss of hearing is due to changes behind rather than in the substance of the membrane.

The history of such cases fully bears out this view, for the patients with this deposit who hear badly are found to have at some time previously suffered from inflammation within the tympanic cavity; so that the changes then wrought by this process will sufficiently account for the failure in hearing.

That the position of the obstacle to hearing is in the conducting media, and, therefore, in the tympanic cavity, and not in the nervous structure, can be in such cases readily demonstrated by experiments with the tuning-fork.

2d. *Loss of continuity in the tympanic membrane does not necessarily interfere with its function, provided that the ligamentous support which it affords to the chain of ossicles is not impaired.*

In several instances where the membrane has been accidentally pierced with a very sharp-pointed object—a pin, the hearing has not been found, with the most careful tests, to be injured. In these examples the healing process occupied from three to four days.

In one case, when a sudden explosion near the ear ruptured the membrane in two places, the hearing was perfect, and the ruptures healed in a few days. This was the only example in which, a rupture having been caused by an explosion, the hearing was uninjured. On comparing the notes of other cases in which the hearing was injured by explosions, it was

¹ The cases on which the following remarks are based came under the writer's notice between 1873 and 1885, inclusive.

found that the hearing suffered more injury when the membrane was not ruptured than when it was. It would almost seem from this (if it were possible for such an explanation to be accepted) that the force of the explosion expended itself partially in rupturing the membrane, and so, in a measure, some hearing was saved. At any rate, it appears not an unfair conclusion that the loss of hearing must be due, in all cases, to damage to the nervous structures; in other words, to what, for want of a more accurate term, must be called shock.

Certain inferences on the question of loss of continuity may also be fairly drawn from instances in which incisions of considerable length are made with a sharp instrument (in shape somewhat like a cataract needle) for surgical purposes. Such incisions are made in a vertical direction and involve nearly the whole length of the membrane from above downward in its posterior section. They are made in cases in which the cavity of the tympanum has been the seat of inflammation which has not caused a perforation of the membrane, and where the effects produced by the inflammatory process have been marked rather on the lining membrane of the tympanic cavity and its contents than on the tympanic membrane itself; in short, where the thickness of the tympanic membrane has not been increased. So far from the incision producing a damaging effect upon the hearing, the reverse is the case, the hearing power being at once improved the moment that sonorous vibrations can pass through the opening. Indeed, were it possible to establish a permanent opening in the membrane, the hearing capacity would be in such instances continuously improved.

That loss of continuity in the tympanic membrane does not of itself interfere with its functions is still further shown by the careful and continual observation of cases in which the membrane is perforated by disease.

The utmost diversity in hearing power with a perforate membrane exists, varying from almost total loss of hearing to a loss so trifling that it is detected with difficulty.

Speaking generally, it may be said that the better degrees of hearing will be found where the perforations are of considerable size, and that the sooner the perforation takes place after the inflammatory process begins the less damage will be done to the cavity and contents of the tympana, and thus to the hearing. To illustrate further my proposition, four examples, the counterparts of which have been repeatedly under notice, may be instanced and in all of these the tympanic membrane has been completely lost by disease.

In the first the loss of hearing has been total; in the second the loss has been of so trifling a nature as to have escaped observation, and only to be detected by the most careful tests with Hughes's sonometer; in

the third and fourth the loss has been very great—that is, spoken words a few inches from the ear are not distinguishable.

In the third the application of a small disk of moistened cotton-wool adjusted with a probe by the patient, gives (by effecting pressure on the stapes) hearing that for the ordinary purposes of life is good.

In the fourth the contrivance is of no benefit.

It seems fair, therefore, to infer that the loss of hearing is due to causes which do not include the loss of continuity in the tympanic membrane.

MICROCOCCUS PASTEURI.

BY GEORGE M. STERNBERG, M.D.,

MAJOR AND SURGEON, U. S. A.

IN a paper published in this journal for July, 1885, the writer gave the name *Micrococcus Pasteuri* to a pathogenic micrococcus which was first observed by him in 1880, in the blood of a rabbit injected subcutaneously with normal human saliva. In the paper referred to, and in a second paper published in the October number of this journal, the *specific* identity of this micrococcus with the so-called “pneumococcus” of Friedländer was maintained.

In my second paper I say:

“In claiming that the micrococcus of Friedländer is specifically identical with my *M. Pasteuri*, it must be understood that I use the word *species* in its botanical sense, and that I recognize different varieties—physiological or pathogenic varieties of more or less permanence—of the same species.”

I had not at this time seen cultures of Friedländer's coccus, but felt justified in assuming *specific identity* on the grounds stated. I have since had an opportunity to compare the Friedländer coccus in pure cultures, obtained from Dr. Koch's laboratory in Berlin, with my *M. Pasteuri*, and I recognize differences which I cannot reconcile with the idea of specific identity.

My inference was based chiefly upon the experimental data showing the presence of *M. Pasteuri* in pneumonic sputum, for I could not doubt that the organism which I found in this material and which I tested by inoculation into rabbits, and by cultures in liquid and in solid media, was identical with the micrococcus which I had so often obtained in pure cultures by the injection of my own saliva beneath the skin of a rabbit. I am still convinced that this is true, and also that in the ex-

periments of Talamon¹ and of Salvioli² my *M. Pasteuri*, and not Friedländer's micrococcus, was the organism found in the blood of rabbits after inoculation with pneumonic exudate. This is shown by their account of the results of their experimental inoculations, which correspond entirely with my own, whereas the Friedländer coccus does not kill rabbits.

Talamon inoculated twenty rabbits with pneumonic exudate or with liquid cultures, and of these all but four died. In the non-fatal cases the animals were sick for five or six days and then recovered. Of the fatal cases, two presented no alterations of the lungs, which were scarcely congested, but a "fibrino-serous pleurisy" and fibrinous pericarditis were found. In eight rabbits there was fibrinous pneumonia, sometimes involving an entire lung, sometimes only the inferior lobe. In these cases also there were pleurisy and pericarditis with fibrinous and serous exudation. The blood of the rabbits which succumbed, contained the oval micrococcus in abundance. Salvioli's injections of pneumonic exudate also proved fatal to rabbits, and, as stated, the pathological appearances described correspond with those which I have reported from similar injections.

Both of the authors mentioned infer from their experiments that croupous pneumonia is an infectious disease, and that the micrococcus found by them in the blood of inoculated animals—*M. Pasteuri*—is directly concerned in its etiology. The experimental evidence which they offer is quite as good as that upon which Friedländer has founded the claim that his micrococcus is the specific germ of croupous pneumonia; for his experiments upon mice, which furnish the only support for this claim, are generally conceded not to be convincing. My inference that the organism found by Talamon and by Salvioli in pneumonic exudate, was identical with that which I had previously found in the blood of rabbits inoculated with normal human saliva, is confirmed by the recently published experiments of Fränkel.³

This author, when he commenced his experiments, about three years ago, had no knowledge of my previously published experiments.⁴ It was by injecting my saliva as a control experiment that I discovered, in the summer of 1880, that it contained a pathogenic organism fatal to rabbits. In like manner Fränkel discovered that his saliva contained the same organism, and, extending his experiments, ascertained that the saliva of other persons in health, or sick with various diseases, contained the same pathogenic micrococcus.

¹ See this journal, July, 1885, p. 114.

² G. Salvioli. Natura infettiva della pulmonite crupale. Arch. per le Scienze Med., vol. viii. pp. 127-148, 1884.

³ Zeitschrift für klin. Med., Band X., H. 5 und 6, S. 402-460, 1886.

⁴ Published in the Bulletin of the National Board of Health, of April 30, 1881, and also in Studies from the Biological Laboratory of Johns Hopkins University, vol. ii., No. 2, 1881.

The morphological and physiological characters of this micrococcus as given by Fränkel correspond precisely with my own recorded observations, and the figures which illustrate his paper, upon comparison with my photo-micrograph published in 1881, will be found to sustain the view that the organism as discovered by him in Berlin in 1883, does not differ from that which I obtained from a similar source in New Orleans in 1880. This is fully recognized by Fränkel, who also agrees with me as to the identity of this micrococcus with that discovered by Pasteur in the blood of a rabbit inoculated with the saliva of a child who died of hydrophobia in one of the hospitals of Paris, Dec. 11, 1880.

Fränkel's experiments correspond with my own also in showing a difference in the pathogenic potency of the saliva of different individuals, and of the same individual at different times. His own saliva was uniformly fatal to rabbits when he commenced his experiments, but a year later it was without effect. I also have found a notable diminution in the pathogenic potency of my saliva during the past two years. During the years 1880-1883 my inoculations almost infallibly caused the death of a rabbit within forty-eight hours. During the past two years I have had quite a number of failures, and in fatal cases death more commonly occurs on the third or fourth day. This result I believe to be due to a diminution in the pathogenic power of the micrococcus, rather than to its absence at times from my buccal secretions.

My earlier experiments showed that the blood of an infected rabbit just dead, is more potent than a liquid culture, or than saliva containing the micrococcus. In short, there is evidence that the organism differs in pathogenic power at different times and under different circumstances.

I have noted that in those instances in which an animal recovers after the injection of my saliva, it is found to be immune when subsequently injected with the more potent virus—blood from a rabbit just dead; and also that a non-fatal attack and subsequent immunity result from the injection of infectious material—blood—which has been subjected to the action of certain chemical agents—sodium hyposulphite, and alcohol.¹ In referring to these results in a later publication, I said:

"It seems probable that a variety of antiseptic substances will be found to be equally effective when used in the proper proportion. Subsequent experiments have shown that neither of these agents is capable of destroying this micrococcus in the proportion used (one per cent. of sodium hyposulphite, or one part of ninety-five per cent. alcohol to three parts of virus), and that both have a restraining influence upon the development of this organism in culture fluids."²

The experimental evidence here referred to I believe to be the first

¹ Experiments with Disinfectants. National Board of Health Bulletin, Washington, 1881, vol. iii., No. 4; also Studies from Biological Laboratory of Johns Hopkins University, Baltimore, 1882, vol. ii., No. 3.
² Bacteria, Magnin-Sternberg, 2d ed., 1884, p. 207.

recorded with reference to the "attenuation of virus" by the use of chemical reagents.

Fränkel has obtained some interesting results by inoculating rabbits in the ear. He has thus produced a local infection, from which the animal recovers after a few days, and has proved that it is subsequently immune.

His inoculations into guinea-pigs, fowls, and dogs gave results corresponding with those previously reported by me—fowls and dogs immune and guinea-pigs less susceptible than rabbits. He has also tested the pathogenic powers of the organism upon cats, pigeons, and mice. The first-mentioned animals are not susceptible, but mice die within forty-eight hours after being inoculated. He finds, as I have found, that the disease produced by subcutaneous inoculation is at first local, and that an inflammatory oedema is induced, which extends in all directions from the point of inoculation. General blood-infection does not usually occur until a short time before death. I have recently obtained a pure culture of the organism by drawing a little serum from the cedematous connective tissue, near the point of injection, through a capillary pipette, in a rabbit which was still in apparent good health.

Fränkel has always been able to obtain a pure culture from blood taken from the heart of a rabbit just dead, and it is from this source that I have usually obtained my pure stock for experimental purposes. He also finds that the organism may be cultivated in veal broth which has been carefully neutralized, but that it does not grow at the ordinary room temperature. A temperature of 30° to 35° C. is necessary for its development. Upon agar-agar, or on solidified blood-serum, it grows, within twenty-four hours, in the form of a superficial, nearly transparent deposit of gelatinous consistence. In surface culture I have often found the organism to form long chains, and, if we accept the classification of Zopf, it must be assigned to the genus *Streptococcus*. In fluid cultures it is commonly found in pairs or in chains of four elements. Fränkel finds the maximum temperature at which the organism will grow to be 42.5° C.

Very interesting are the results obtained by Fränkel in his inoculations with cultures made at different temperatures, and especially with a fluid culture which had been kept at a temperature of 35° C. for sixteen days. I quote in full the record of the last-mentioned experiment, in which we have evidence of a remarkable modification of pathogenic power which is very significant.

On March 12th, 0.4 c. c. of a pure culture in veal broth was injected into the right lung of a rabbit. This culture had been kept in the incubator at 35° C. since the 25th of February. Temperature of rabbit before injection, 39.4° C.; the following day the same; March 14th, 40.7°; March 15, 39.6°; March 16th, dead. Since the preceding day

there had been severe dyspnoea. At the autopsy fibrinous pleuritis on both sides, and fibrinous pericarditis was found. In the right pleural cavity only a few drops of fluid exudate. Enormous tumefaction of the spleen; typical cocci in the blood. *The inferior lobe of the right lung entirely hepatized, grayish-red, in part already changed to gray hepatization.* Sections of granular consistence, as in genuine croupous pneumonia in the human lung. The left lung also presented an evident engorgement.

The results obtained by Fränkel with reference to the influence of various temperatures on the pathogenic power of this micrococcus are as follows: In fluid media a temperature of 42° C., maintained for two days, suffices to neutralize the virulence of the culture. The same result is obtained at a temperature of 41°, maintained for four or five days. Between 39.5° and 40.5° the virulence is no longer abolished, but is so far modified that inoculations no longer give rise, in the rabbit, exclusively to the typical condition of the blood and enlarged spleen of septicæmia, but simultaneously to an intense localization of the virus in the serous membranes of the heart and lungs.

In his experimental injections of pneumonic sputum Fränkel has obtained results identical with my own, detailed in my paper published in this journal for July, 1885, and with those of Talamon and of Salvioli. He finds that no sputum is more certain to contain this micrococcus than the rusty sputum of patients with pneumonia. In the course of two years he has made thirty-eight subcutaneous injections into rabbits of sputum mixed with distilled water, or with a dilute solution of carbonate of soda (0.3 per cent.). Twenty rabbits were injected with sputum obtained from genuine cases of croupous pneumonia between the second and sixth day of sickness. Exactly one-half of these animals died of typical "sputum-septicæmia;" the remaining ten were not affected, or suffered from other septic processes. The remaining eighteen rabbits were injected with the saliva of healthy individuals (five), or with the sputa of patients suffering from other pulmonary diseases than pneumonia—mostly acute or chronic bronchial catarrh. Of these eighteen, only three had typical septicæmia.

Fränkel has made a very interesting observation with reference to modification of virulence which is in accord with the results of my own experimental studies. He finds that the micrococcus does not disappear from the sputa of patients with pneumonia after the termination of the disease, and has proved by injection experiments that it may still be present at the end of some weeks. But his experiments show that the virulence is no longer so considerable, and that death may occur as late as the sixth day, instead of in from twenty-four to forty-eight hours, as is the case when the rusty sputum of the inflammatory stage of the disease is the material injected.

The experimental evidence on record shows, then, that M. Pasteuri,

which is present in the buccal secretions of healthy individuals in various parts of the world, is also found, with greater certainty, in the exudate of croupous pneumonia. Whether it is found in this material simply because it is at hand in the buccal cavity, and finds in the pneumonic exudate a suitable medium in which to develop, or whether it is concerned in the etiology of croupous pneumonia, is an unsettled question. We have experimental evidence, however, that this micrococcus does give rise to local inflammation, accompanied with a serous or sero-fibrinous exudate, when it is injected into the subcutaneous connective tissue, or into the pleural cavity of rabbits.

In my paper heretofore referred to, I have ventured to suggest the following hypothesis, which seems to reconcile clinical observations with the experimental data, and enables us to account for the occurrence of isolated cases of croupous pneumonia, without denying the infectious character of the disease.

"It is established that this is a pathogenic organism, so far as certain lower animals are concerned, and that its pathogenic power varies under different circumstances. It seems extremely probable that this micrococcus is concerned in the etiology of croupous pneumonia, and that the infectious nature of this disease is due to its presence in the fibrinous exudate into the pulmonary alveoli. But this cannot be considered as definitely established by the experiments which have thus far been made upon lower animals.

"The presence of this micrococcus in the buccal secretions of healthy persons indicates that some other factor is required for the development of an attack of pneumonia; and it seems probable that this other factor acts by reducing the vital resisting power of the pulmonary tissues, and thus making them vulnerable to the attacks of the microbe. This supposition enables us to account for the development of the numerous cases of pneumonia which cannot be traced to infection from without. The germ being present, auto-infection is liable to occur when from alcoholism, sewer-gas poisoning, crowd poisoning, or any other depressing agency, the vitality of the tissues is reduced below the resisting point. We may suppose, also, that a reflex vasomotor paralysis, affecting a single lobe of the lung, for example, and induced by exposure to cold, may so reduce the resisting power of the pulmonary tissue as to permit this micrococcus to produce its characteristic effects.

"Again, we may suppose that a person, whose vital resisting power is reduced by any of the causes mentioned, may be attacked by pneumonia as a result of infection from without with material containing a pathogenic variety of this micrococcus having a potency, permanent or acquired, greater than that possessed by the same micrococcus in normal buccal secretions."

This hypothesis does not exclude the view that Friedländer's micrococcus, and perhaps other pathogenic organisms, may act in like manner. We may eventually find that there are various pneumonia-cocci, just as we have learned that the pus of acute abscesses contains sometimes one and sometimes another coccus, or again two or more in association. It

can scarcely be doubted that these pus organisms are responsible for the local inflammatory changes which give rise to the formation of abscesses. But furuncles and abscesses cannot generally be traced to external infection, and it seems probable that, as a rule, they are due to auto-infection, and that the organisms which produce them are widely distributed and always at hand ready to take advantage of circumstances relating to the individual which are favorable to their development. In like manner general blood infection—septicæmia—may, perhaps, result from auto-infection in certain cases.

The conclusions of Fränkel are in accord with the views stated in the above-quoted extract from my paper referred to. This author concludes his elaborate paper as follows:

“Finally, as regards the relative frequency of the two hitherto investigated microbes, in cases of pneumonia, no positive statement can yet be made. Nevertheless, I am inclined to regard the lancet-shaped pneumonia-coccus, which is identical with the microbe of sputum-septicæmia, as the more frequent and the usual infectious agent of pneumonia, on the ground that this organism is so much more frequently found in the sputum of pneumonic patients than in that of healthy individuals. This conclusion is further supported by the circumstance that it has not hitherto been possible to isolate directly from the rusty sputum, Friedländer’s bacillus.”

The evidence furnished by Talamon’s experiments is decidedly favorable to the view that this micrococcus may be concerned in the etiology of croupous pneumonia. Thus Prof. Germain Sée, in his recent work,¹ says:

“The rather brief description of the lesions obtained by Friedländer in inoculated mice, leaves some doubt in the mind; for the presence of indurated foci—*noyaux*—in congested lungs does not suffice to characterize fibrinous pneumonia. But the lungs of rabbits presented by Talamon to the Anatomical Society, in support of his communication, cannot be the subject of discussion. As he remarks, the appearances are not at all those of foci of broncho-pneumonia in a congested lung, as one constantly observes in rabbits dead of septicæmia, but a veritable lobar fibrinous pneumonia with pleurisy and pericarditis of the same nature. The naked-eye appearances, as well as the microscopical examination, showed no difference between the lesions produced in the rabbit and the pneumonia of man.” (Op. cit., p. 92.)

Evidently Prof. Sée supposes, as I did for a time, that the micrococcus which Talamon encountered in pneumonic exudate, and which produced the effects described, is identical with that of Friedländer. That this is a mistake is now apparent. No doubt Talamon’s results were due to the presence of *M. Pasteuri* in the pneumonic material and culture-fluids which he used in his inoculation experiments. This is shown by the fact that 16 out of 20 rabbits injected died, while Friedländer’s coccus does not kill rabbits. Of the 20 rabbits injected directly into the lung,

¹ *Maladies Spécifiques (non-tuberculeuse) du Poumon.* Paris, 1885.

8 are said to have presented the lesions of fibrinous pneumonia, together with fibrinous pleurisy and usually fibrinous pericarditis. "The blood of the rabbits contained the *elliptical* coccus in abundance." Both Fränkel and Talamon sometimes speak of this coccus as lancet-shaped or lanceolate. Prof. Sée says:

"Seen in the fibrinous exudate, the microbe has an elliptical form like a grain of wheat. Cultivated in a liquid medium, an alkaline solution of meat extract, it is more elongated and takes the aspect of a grain of barley."

FIG. 1.



Micrococcus Pasteuri. From blood of rabbit inoculated subcutaneously with normal human saliva. Magnified 1000 diameters. From a camera lucida drawing.

I have commonly spoken of this micrococcus as oval, but in the blood or in a rich culture medium, when in active growth, it is often so long an oval as to appear lanceolate. (See Fig. 2.)

FIG. 2.

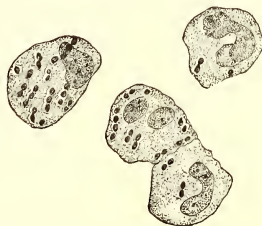


Micrococcus Pasteuri. From blood of rabbit inoculated subcutaneously with fresh pneumonic sputum from a patient in the seventh day of the disease. Magnified 1000 diameters. From a camera lucida drawing.

On the other hand, in surface cultures it often approaches more nearly a spherical form.

The morphological characters of *M. Pasteuri* are shown in the accompanying figures, which illustrated my former paper, and which are here reproduced for the convenience of readers.

FIG. 3.



Copied from illustration accompanying the paper of Salvioli in the *Archivio per le Scienze Mediche*, Turin, vol. viii. Fig. 2. "Cells of the pleuritic exudation containing pneumonia-cocci, mounted in Canada balsam." Stained with gentian-violet. Amplification not stated (about 1000, G. M. S.).

The mucinous envelope, or "capsule," is very well shown in Fig. 3. It has been shown by recent researches that this so-called capsule is by no means peculiar to Friedländer's coccus, although it is developed in this organism to an unusual extent under certain circumstances—*e. g.*, in the blood of an infected mouse.

Sänger,¹ in a paper recently published, maintains that neither the capsule nor the nail-shaped growth in gelatine is peculiar to Friedländer's pneumococcus." This author has isolated five different micrococci by means of plate cultures, from pneumonic exudate.

Thost,² of Hamburg, has demonstrated the presence of Friedländer's coccus in great numbers in the nasal secretions of patients suffering from ozæna. It was found in twelve out of seventeen cases, and was isolated by Koch's plate method. The coccus obtained from this source was proved by culture and inoculation experiments to be identical with that described by Friedländer. It does not kill rabbits, but is fatal to mice. These experiments were made in the laboratory of Prof. Frisch, of Vienna.

A CASE OF TRAUMATIC NEURITIS OF THIRTY-FIVE YEARS' DURATION.

TREATMENT BY REPEATED NERVE SECTION; SUBSEQUENT HISTORY
AND AUTOPSY.

BY R. OSGOOD MASON, M.D.,
OF NEW YORK.

THE following case has been observed with interest by many physicians and surgeons, during the past fifteen years, both in this country and also in Europe; and reports of it at various stages of its progress have been published by Dr. S. Weir Mitchell in the volumes for July, 1874, and April, 1876, of this journal, and in the first volume of *Brain*. The case terminated fatally on the 17th of September last, and it is thought that an abstract of what has been published, together with a brief history of the case during its later stages, and a report of the post-mortem appearances, would be of value.

Miss H. T. when two and a half years of age ran a splinter into the palm of the right hand over the point where the median nerve divides to send branches to the thumb and fingers. It passed so deeply into the hand that it was thought best to poultice and promote suppuration; but, contrary to expectation, the wound healed kindly, and soon all irritation

¹ Bacteriologische Untersuchungen über die Pneumonie und pneumonische Metastasen. Archiv f. exper. path. u phar., B. xx., H. 5 u. 6, 1886.

² Pneumoniekokken in der Nase, Deutsche med. Wochenschrift, No. 10, March 11, 1886.

passed away. The splinter, however, could always be felt, and once, when the patient was twelve years old, it was for a time somewhat painful.

At the age of twenty-two years, Miss T., then being in Naples, caught hastily the top of a trunk as it was falling forward, and in so doing bruised the region in which the splinter lay. Great local pain and some swelling followed, which, however, soon passed away, leaving only slight uneasiness in the bruised part. Three months later she had pain in the right shoulder, which Dr. Suchet, of Paris, regarded as rheumatic. In May of the same year, 1871, the pain in the hand grew worse, and was severe in the median palm, thumb, and palmar surface of the index finger. In August, and later, while travelling, the pain further increased, extending now to the forearm, and was associated with the most distressing hyperæsthesia. It being now evident that the trouble was caused by the splinter, it was removed at Milan, October 22, 1871, by Dr. Sapolini, Surgeon to the King of Italy, assisted by Dr. Guerini. It was found to lie among the diverging median nerve filaments, and was removed with considerable difficulty.

On awakening from the chloroform sleep the patient was at once conscious of intense pain in the forefinger and thumb. Within a few days the fingers contracted in a firm flexion, the pain became exquisite, so that the least touch was torture. The wound healed in a month, but the pain and hyperæsthesia were so great as to make it necessary to keep the patient almost constantly under the influence of morphia. The pain soon extended to the back of the hand, affecting especially the last two phalanges of the second and third fingers; it also passed up the forearm; the shoulder continued painful, and there was severe neuralgia in the right side of the face and neck, and even in the right foot.

During this time she went from one well-known physician to another in search of relief. Heat, cold, blisters, electricity, Vienna paste, the cautery, and a host of other remedies were successively used, but morphia given hypodermically was found to be the only remedy which gave any actual relief.

In November of the same year Dr. Sapolini, after most careful observation, found that while continued pressure on the median nerve in the forearm only increased the pain, pressure on the musculo-spiral, while at first increasing it, after a time diminished, and finally destroyed not only the pain but even the sensitiveness, so that the fingers and thumb could be roughly handled so long as the pressure was continued. Having convinced himself of this fact, he cut down on the musculo-spiral nerve above the outer side of the elbow, and removed one inch of it. Perfect relief followed this procedure; at the same time, to the amazement of the operators, the sense of touch in the radial region of the back of the hand was scarcely, if at all, diminished.

On the eighth day after the operation the pain suddenly came back, and while the extreme torture never fully returned, the associated sensations and evils grew worse, and, notwithstanding the most skilful efforts to sustain it, the health began seriously to fail.

In 1872 the patient, under the advice of Sir James Paget, was using an extended series of hot arm baths, and in February, by advice of the same eminent surgeon, she returned to America and placed herself under the care of Dr. S. Weir Mitchell, who has ever since taken great interest in the case. A full report of his examination and treatment at this time,

together with the earlier history, is published in the *AMERICAN JOURNAL OF THE MEDICAL SCIENCES* for July, 1874. I will only give sufficient here to make the history connected and intelligible.

At this time, without any notable functional trouble, the patient was thin and weak, and singularly liable to sudden flushes or as sudden pallor. The hyperæsthesia was still extreme, so that day and night her chief care was to protect the hand and arm from any possible foreign contact. There was considerable loss of power, which Dr. Mitchell remarks was probably chiefly due to the "inhibitory power of constant pain."

Touch and the power to localize touch were normal, except just below the scar left by the operation on the musculo-spiral, where touch was indistinct and was referred above the scar, and also at some points where touch was either felt as both touch and pain or else was in a condition of hyperæsthesia which entirely overwhelmed the normal sense of touch. The great nerve tracts were tender upon deep pressure, and this pressure over the median and musculo-spiral above the scar caused pain in the hand.

Careful study convinced Dr. Mitchell that the cause of the trouble lay in the disordered filaments of the median nerve in the hand, and he decided to divide that nerve in the forearm. The operation was performed by Dr. Brinton, assisted by Drs. Keen and Sinkler, March 2, 1873. Three-fourths of an inch of the nerve were removed and the end of the lower portion was "turned in a transverse direction into the surrounding tissue" and fixed there by a wire suture. The ends of the nerve retracted, so that there was a space of one inch and a half between them. The relief from this operation was very marked, and ten months later, after giving particulars regarding sensation and motion in different parts of the arm and hand, Dr. Mitchell remarks, in closing, "There is absolute freedom from pain; the nails grow alike; the thumb muscles are atrophied."

A microscopic examination of the excised portion of the median nerve by Dr. Bertolet, showed disintegration and atrophy occurring primarily in the nerve filaments themselves, as distinguished from the disintegration and atrophy occurring primarily in the connective tissue of the nerve; that is to say, the nerve was the subject of Wallerian degeneration.

As early as 1874 severe pain returned in the line of the incision over the musculo-spiral nerve which had been divided by Dr. Sapolini in 1871. Again every sort of treatment, mild and severe, was resorted to in order to obtain relief, but without success. At length in March, 1875, under Dr. Mitchell's advice, Dr. Brinton cut down through Dr. Sapolini's old incision. He found the two bulbous termini of the divided nerve an inch apart, but thoroughly joined by new nerve tissue. This new tissue, the two button-like expansions which it connected, and a portion of the original nerve trunk on either side of them, three inches in all, were removed. There was at once partial relief from the pain and the relief was progressive, so that three months after the operation there was no pain at all.

Miss T. returned to Dr. Mitchell in June, 1877, complaining of great pain in those portions of the hand and arm supplied by the median nerve. The return of sensation and also of motion by means of galvanic excitation made it evident that the nerve had united. Again, under Dr.

Mitchell's advice, Dr. Brinton cut down on the median in the site of the old operation, and found the two bulbous extremities of the severed nerve. Here also connection had been established, but, unlike the former case, the filaments connecting the two bulbs were so small as to be scarcely perceptible. They were, however, sufficient to be the bearers of the mischievous influence, and it was decided again to sever the continuity. Three inches of the median nerve were accordingly removed, including the two bulbs with the connecting filaments and a little of the original nerve trunk on either side. The result was general abolition of pain at the surface and impairment of touch in various degrees at different points, but there was great pain on pinching or deep pressure, and this condition of things remained substantially the same for a considerable time.

From June, 1878, to June, 1885, the patient then being in New York, was mostly under the care of Dr. Mary Putnam Jacobi, with occasional intervals of professional attention from Dr. T. S. Robertson and others. Dr. Jacobi has kindly favored me with full notes together with a synopsis of the case by periods while under her care, from which I have prepared the following condensed statement.

First period—one year, June, 1877, to June, 1878—was characterized by great mental depression from religious excitement, and later by a severe attack of *acne on the face*, lasting three or four months. There was, for the greater part of the time, freedom from pain.

Second period—eighteen months, June, 1878, to Jan. 1880—characterized by *disturbances of the sexual organs*. There was a painful menstruation following a mild vaginitis, occurring without any known cause. There followed symptoms of metritis and ovarian congestion, and these were accompanied by leucorrhœa, pain in the left ovarian region and intense headache. In March, 1879, there were symptoms of fundal endometritis, yielding to ergot, iron, and strychnine, followed by an attack of parametritis, which yielded to calomel. Later, there was retroversion of the fundus uteri, accompanied by congestion of the cervix, and dilatation of the cervical canal; and later still, displacement of the left ovary behind the uterus, where it was found enlarged and painful. In Jan. 1880, by local treatment with iodine, and the use of bichloride of mercury both internally and hypodermically, the pelvic symptoms had permanently passed away. During this time headache had not been a prominent symptom, pain in the hand was slight, but once there was a very severe attack of pain in the cervico-brachial plexus, and once a temporary return of the mental depression.

Third period—Jan. to April, 1880—three months of good health.

Fourth period—April, 1880—characterized by a severe illness with symptoms of *basal meningitis*. In going out to church on Good Friday the patient complained of the intense glare of the sunlight, making it almost impossible for her to see or to keep the eyes open. There was the same trouble on her return home. A few hours later she was seized with violent pain in her eyes attended with generalized headache, violent vomiting, and profound prostration. The following symptoms then occurred. Two days later there was retraction of the head, with great tenderness on pressure in the nape of the neck, and rigidity of the cervical muscles. There was intense vertigo on raising the head from the pillow.

The pupils were widely dilated and insensible to light; vision markedly diminished, but no complete amaurosis. Pink suffusion of the conjunctivæ, pulse 100. No rise of temperature. There was no general hyperæsthesia, eruption, albuminuria, or enlarged spleen, no special tenderness in the spine below the neck; there was some deafness in the right ear. Recovered in three weeks under opium and iodide of potassium. Queries: Was it an optic neuritis (Robertson), or cerebro-spinal meningitis, or a localized meningitis near the chiasma, or was it a pseudo-inflammatory condition with a hysterical origin?

Fifth period—June, 1880, to June, 1881—characterized by symptoms of *pachymeningitis*. The period commenced with constant pain in the eyes, greatly increased by attempts to use them; this pain, much less in June and July following the severe illness just referred to, became severe in August, and extended to both frontal and occipital regions, occasionally much exacerbated, and becoming paroxysmal in character. Sleep was unusually sound during the night, and there was marked somnolency during the day; nausea in the morning, and a sense of swaying to the right side; tenderness on pressure below the occiput and behind the right mastoid process. November 4th the eyes were examined by Dr. Noyes. He found hypermetropia and slight astigmatism; the optic nerve in each eye deeply excavated on the temporal side, perhaps normal; deep hyperæmia on nasal side, color-field also limited on that side; veins large, arteries small; debility of the external recti muscles. At an examination three years later Dr. Noyes found this weakness of the external recti very marked, and the proper glasses gave marked relief from many of her unpleasant head symptoms, and enabled the patient to use her eyes with perfect comfort. In December the headaches became constant and intense, with frequent acute exacerbations, the pain being mostly in the occiput, right temple, and right vertex. Patient has sensations as if surrounding objects were falling; has disagreeable hallucinations of sight. Pain is decidedly in the right side of the head; the trigeminus of that side affected. Surface temperature of the opposite sides of the head compared: left, 91.5° ; right, 94.2° .

Paquelin's cautery was used at the seat of pain with some relief; ice was also of use. The fourth cauterization, together with the use of the iodide of potassium, was followed by improvement which lasted nearly two months, when pain returned in the back of the neck, also violent pain in the brachio-cervical plexus, extending down the outer aspect of the arm. Cauterization of the neck relieved to some extent, but the pain returned in the right side of the head with a sensation of bursting, and a return of nausea. Cauterized the scalp, and gave ergotine, with temporary relief of pain, but peculiar sensations, as of hands tightly grasping the knees, heaviness of the limbs, and constant stumbling appeared. In May thirty grains of iodide of sodium were given daily with benefit, and under this treatment the symptoms permanently disappeared, so that the summer of 1881 was characterized by a fair degree of general health.

Sixth period—October to December, 1881—characterized by first appearance of severe *nervous dyspepsia*. This was relieved by local faradization, but returned, accompanied by violent headache, and then both disappeared with a violent "nerve storm" after faradization of the cervical sympathetic.

Seventh period—winter of 1881-82—characterized by a third attack

of mental depression approaching melancholia. It supervened upon a protracted period of fatigue, watching, and anxiety, caused by the dangerous illness of the patient's mother.

Eighth period—November, 1882, to October, 1883—characterized by increase of the dyspeptic attacks.

Ninth period—October, 1883—characterized by a return of headache, prostration, vertigo, eye troubles (for which Dr. Noyes prescribed), and continuation of the dyspepsia. At this time, during Dr. Jacobi's absence from the city, Dr. Robertson discovered four per cent. of sugar in the urine. It was, however, only temporary, and three weeks later careful examination gave only negative results.

Tenth period—January, 1884, to June, 1885—characterized by frequent attacks of dyspepsia, of varying intensity; one, in January, 1885, being of such a character as to remind one of a gastric crisis in locomotor ataxia.

Miss T. came under my care June 9, 1885. The condition of the right hand and arm was as follows: They were of a purplish color, cold to the touch, and entirely useless. The muscles were atrophied, the whole arm small, the wrist dropped, and the fingers were contracted. The hand could be slightly extended, but very slowly, and with persistent effort; the thumb, index, and second fingers had no voluntary motion, the ring and fourth very little. The forearm could be moved voluntarily, but she preferred to move it with the other hand; the whole arm from the shoulder could be freely moved, but without force. There was no constant pain below the elbow; sensation in the hand was very poor, so much so that it was occasionally cut or burned without being perceived at the time, yet foreign contact was extremely disagreeable, and pressure or rough handling gave great pain. There had been much more pain of a neuralgic character during the year past, so that she began to fear a return of all her old torment. Pain in the hand and forearm, however, had not been troublesome since the second operation on the median nerve in 1877, but she suffered greatly from pain in the head and neck, often extending to the shoulder and arm, and sometimes even affecting the shoulder and arm of the left side.

This pain in the head and neck was especially severe. It was increased by any sudden movement of the head, by sitting bent forward as in sewing, and notably by fatigue or excitement; on the contrary, it was much relieved by rest.

A second marked and prominent feature of the case at this time was a most persistent and distressing dyspepsia. This was indicated by pain in the epigastric region very soon after taking food, and by nausea, almost always present, but which seldom reached the point of vomiting. There was also anæmia, accompanied by great physical weakness, and very marked nervous prostration. There was very little of the hysterical element—at least in any of its usual manifestations—in her case; the intellect was clear, the judgment good, and the will-power strong. The pulse and temperature were normal; the alvine and urinary discharges were regular and normal, the urine containing neither sugar, albumen, nor casts. A fair amount of sleep was obtained, but the nausea returned on awakening, and the pain also after taking food, and often remained when the stomach was empty. Acne was present upon the face, but was unusually developed upon the shoulders and back.

She was treated by rest in bed, carefully selected food in small quanti-

ties; peptones, bismuth and pepsine, nux vomica, and especially by nutrient enemata and quinine also administered by the bowel.

Some improvement followed, but a little extra exertion brought back all the old symptoms in an exaggerated form. Stimulants were apparently well borne, and were used in regulated doses. In addition to the remedies already mentioned, Kumyss, drop doses of ipecac, hydrarg. bichlor. in minute doses, dry cups, heat, cold, galvanism applied at the epigastrium so as to carry the current through the stomach, were all tried, sometimes with some temporary relief, but never with any permanent improvement. The bowel was unusually tolerant of enemata, and gradually, by the end of six weeks, scarcely any nourishment was taken except by injections.

On the 12th of August a violent attack of vomiting occurred, causing great prostration. The attack was controlled by suppositories of morphine and extract of belladonna. After this neither food of any kind nor stimulants were taken into the stomach until the last week of her life.

Each enema now consisted of—

Leube's beef	3vj.
Whiskey	3iv.
Water	3j.

and was administered every four hours. It was well retained and absorbed, and the alvine discharges were regular and normal.

August 18. Pulse 80, regular, and distinct, but without much force; temperature normal. Not a particle of food or drop of stimulant has been taken by the mouth for six days; nevertheless, the distress and the nausea continue, and with very little amendment. A little water is the only thing which can be taken without causing additional discomfort.

Peptonized milk was now substituted for a part of the water in the enemata. It caused constipation, the eructation of foul gases, and great general discomfort.

August 27 and 28. Each day patient chewed a very small amount of beef, swallowing only the juice; the second trial caused decided increase in the distress and nausea, and it was not continued.

29th. The constipation caused by the peptonized milk gave way, and was followed by moderate diarrhoea. Four discharges from the bowels and several attacks of vomiting occurred during the night, so that on the morning of August 30th I found my patient in a most alarming state of collapse. A fair reaction was brought about by means of hypodermics of brandy, and later in the day two drops of a one per cent. solution of glouin were added to the enemata, with very perceptible stimulating effects. Dr. James R. Leaming saw the patient with me in the evening.

31st. Nausea still excessive, and vomiting recurs occasionally, but is less distressing. Reaction is well maintained; pulse 112; temperature $99\frac{1}{2}^{\circ}$; sleeps fairly, one or two hours at a time; is apathetic, entirely without interest in her surroundings.

September 3. Began to complain of imperfect vision, could not distinguish faces; she also has hallucinations of sight, of which, however, she is perfectly conscious, and which she describes and laughs over. Bedsores are troublesome.

5th. Sight very bad; cannot discern colors at all, nor forms with exactness. Her hallucinations are very distinct, and present colors.

She describes a row of little green dolls sitting around on the edge of the basin beside her; sees only the lower half of objects. Smell, usually very acute, is abolished; hearing is abnormally acute; taste normal.

6th. A decided amelioration of the nausea; no vomiting for forty-eight hours past; voice stronger; interest in surroundings has returned; turns on her side, which she has not done before for a week. Special senses the same as yesterday; she is perfectly contented and happy. I should say there was decided mental exhilaration, almost flightiness, yet when concentrated the mind acts brightly and logically.

8th. No vomiting; scarcely any nausea; patient is very happy; ordered the marketing and preparation of her mother's food as she was accustomed to do before her severe illness, and does so with perfect judgment and propriety. Special senses the same; pupils natural and contract in the light; she scowls at the sudden admission of light; pulse 110; temperature 99°; hearing commences to be dull; manner of talking slightly excited.

9th, 10th, and 11th. Patient continues much the same. She caters for her mother, recognizes her friends by voice; no nausea or distress of any kind. Teaspoonful doses of meat juice were taken and enjoyed, producing neither nausea nor pain.

12th. Slept unusually long and soundly last night and is still somnolent. She is easily aroused but the intellect is dull; she is cheerful, has no distress, nothing troubles her; ordered the marketing and talked pleasantly about it; all the special senses dull except taste.

14th. Pulse 130; temperature 99°; respiration 30. Dr. Noyes saw the patient and examined the eyes; result negative, except that there was hyperæmia of the nerve.

15th. Very difficult to arouse, respiration sighing. Has passed no urine in twenty-four hours; drew off a pint and a half. Specific gravity 1.026, no albumen, no sugar, no casts.

16th. Much the same as yesterday; no paralysis; sphincters not relaxed. At 10 P. M. respiration 8.

17th. 12.10 A. M., respiration 7 and easy. 12.40 A. M., it ceased suddenly.

Autopsy, thirty-six hours after death, was conducted by Dr. R. W. Amidon. Present: Dr. W. T. White, Dr. Geo. W. Leonard, and Dr. J. S. Hill. Rigor mortis well marked, emaciation extreme. There was very marked atrophy in both the flexor and extensor regions of the forearm, and in the extensor region of the arm. The right thenar eminence had almost entirely disappeared. Circumference of the arms compared was as follows: right arm biceps, 6½ inches, left, 6¼ inches; right forearm, 5½ inches, left, 6¾ inches. Scars from the different operations distinct. The brain and spinal cord were carefully examined, but neither presented any appreciable gross lesions. The nerves of the right arm were examined with the following result. Dividing the tissues over usual course of the median nerve in the region of the scar no nerve was discovered; but after prolonged search the termination of the upper portion of the divided nerve was found at a point two inches above the scar, and at the extreme ulnar edge of the interosseous space. The nerve terminated with the usual bulbous expansion, and with no nerve filaments, however minute, apparently extending from it in any direction. The most thorough search from this point down to the annular ligament failed to discover any trace of the lower portion of the nerve. Search was then made for the musculo-spiral nerve. The termination of the upper por-

tion of this nerve was also found retracted to a considerable distance above the scar and far around on the inner aspect of the humerus. It also ended in a large bulb with no trace of any filaments going out from it in any direction. After careful search the lower portion was found nearly in its normal course, but retracted downward so that the distance between the ends of the severed nerve was fully three inches. The lower portion of the nerve terminated without any expansion and was apparently even diminished in size. Both the median and musculo-spiral nerves were removed from the point of section almost to the spinal cord, and also a portion of the median nerve of the left arm, which, together with the brain and spinal cord, were preserved for further examination.

The abdominal organs were found to be in a healthy condition. The stomach was empty and without any appreciable morbid change. The pelvic organs were examined *in situ*, and presented no morbid changes except a small cyst the size of a split pea on the posterior wall of the uterus. Thoracic organs not examined.

Dr. R. W. Amidon has carefully attended to the pathological work and furnishes the following report of the microscopic examination.

"The enlargement at the end of the musculo-spiral nerve was three centimetres long and kidney-shaped; that at the end of the median nerve was two centimetres long and fusiform. The latter alone was examined. It consisted almost entirely of highly developed connective tissue, apparently of considerable age and slow formation. Here and there, principally at the surface of the tumor, remained traces of bundles of nerve fibres which contained, for the most part, granular detritus and neuroglia tissue. Occasional apparently healthy nerve fibres were seen.

"A section of the median nerve about two centimetres above the neuroma revealed the following changes.

"The sheath of the nerve, together with that of the component bundles of the nerve, was a trifle thicker than that of the opposite healthy median nerve, there were in these different connective-tissue coverings more young cells than would normally exist in such tissue. The fasciculi of the nerve contained many perfectly healthy nerve fibres, but these were irregularly interspersed throughout the bundles, patches, and tract, where normal nerve fibres were replaced by degenerated nervous tissue, and a proliferation of neuroglia elements existed throughout the bundle; which changes point to a diffuse, subacute, inflammatory process, and a degeneration, confined to certain, probably sensory, groups of fibres.

"Sections of the three nerve trunks in the axilla presented the same changes in many, but not all, fasciculi. Here, as below, the degenerative changes were pretty diffuse, at the same time leaving intact very many nerve fibres.

"Sections of the spinal cord, above, below, and at the point of emergence of the brachial nerves, show no lesions whatever.

"Sections in the medulla, through the pneumogastric and hypoglossal nuclei, when compared with normal sections in the same region, show no appreciable change.

"Sections of occipital convolutions appeared normal."

The changes here found belong simply to an ascending neuritis, involving only the trunk and peripheral nerves without invading the cord,

and no pathological changes appear in the brain or medulla. So what was the nature of the mischievous influence which caused the serious and finally fatal disturbances which occurred in the latter development of the disease, is not clear. It can scarcely be doubted, however, that in some way they were due to the same cause which wrought so much evil in the early history of the case, and the destructive work of which is so clearly traced through the nerve trunks quite to the spinal cord. How that cause made its influence felt in the distant and internal organs subsequently invaded, whether in some way it continued on by the cerebro-spinal system, or changed its course to the sympathetic, is not easy to decide.

The symptoms developed in the different internal organs, while of a distinct and well-defined character, lacked the distinctive features of an inflammatory process; and the post-mortem examination gave no evidence of any inflammatory process having taken place in any one of them. But upon the supposition that the disease, which early caused so much mischief in the trunk and peripheral nerves, chose the ganglionic system for its subsequent progress, we might expect severe congestions to occur in the organs which were influenced by the different ganglia as they successively became the subject of either inflammatory or degenerative changes.

Dr. Jacobi suggests a series of vasomotor paralyses as best explaining the series of distressing symptoms which occurred while the case was under her care.

Dr. Duménil, of the Hôtel Dieu de Rouen, in the *Gazette Hebdomadaire* for January, 1866, reports a case presenting points of interest in connection with the one here described. I shall be pardoned for briefly referring to it.

A healthy laboring woman, thirty-six years of age, rode on a hard seat in a jolting wagon, sitting four hours continuously on the right buttock in such a way as to make constant pressure on the sciatic nerve of that side. Numbness was felt at the time, a neuritis was commenced which involved first the lower and then the upper extremity of the right side, causing pain, atrophy, flexions, and partial paralysis. Then there was a period of improvement in the condition of the affected muscles, and a fair condition of health, followed, after nearly four years, by the same series of symptoms and lesions in the lower and upper extremity of the *left* side. The lips, tongue, pharynx, and larynx were also involved. The case terminated fatally about six years from the time of the injury. Two months before death epigastric pain and persistent vomiting became prominent symptoms; there were also hiccup and distressing contractions of the diaphragm. Treatment was of little avail. Electricity increased the pain, and did no good. The vomiting was entirely uninfluenced by remedies. The patient died of exhaustion and dyspnoea. The vomiting ceased two days before death. The intellect was clear to the last.

Post-mortem examination showed atrophy of the affected muscles, changes both inflammatory and degenerative in the large trunk and peripheral nerves, and localized degenerative changes scattered at irregular intervals throughout the gray substance of the cord and the adjacent white substance.

In neither of these cases was the pneumogastric nerve examined, nor the ganglia of the sympathetic. Is it not probable that careful research in that direction, in similar cases, might be productive of interesting results?

THE SURGERY OF THE PANCREAS,
AS BASED UPON EXPERIMENTS AND CLINICAL RESEARCHES.¹

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IN the following article, an attempt will be made to lay the foundations for a rational method of treatment of some of the injuries and diseases of the pancreas by direct surgical measures. The literature on the surgery of the pancreas is exceedingly scanty and loosely scattered through the medical journals and text-books, as no previous attempt has been made to arrange the material in a systematic form for ready reference. Our present knowledge of the surgical treatment of diseases of the pancreas, is limited to a few operations performed for the cure of retention cysts, by excision or the formation of an external pancreatic fistula. The clinical material which I have collected, and more particularly the description of pathological conditions found within and around the pancreas at post-mortem examinations, will be utilized for the purpose of pointing out new indications for operative interference, by such methods as will suggest themselves from the results obtained by experiments upon animals.

EXPERIMENTS ON THE PANCREAS.

The operative treatment of injuries and diseases of the pancreas belongs to the future. Until now, the efforts of surgeons have been limited to the treatment of a few cases of cysts of the pancreas. The results obtained in these cases have been so encouraging, that undoubtedly other lesions of this organ will soon constitute new indications for surgical treatment.

The clinical material that is now available is inadequate to furnish a reliable basis for new operations; on this account it has been my object to obtain new light by subjecting the pancreas to a variety of surgical procedures, to ascertain the tolerance of this organ to direct treatment, and to determine, if possible, how much of the gland could be removed safely in case it is the seat of injury or disease. The object of these experiments also included an attempt to elucidate some of the causes and

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pathological conditions of some of the well-recognized lesions of this organ.

Dogs and cats were used exclusively as objects of these experiments, as a few trials soon satisfied me that in the smaller herbivora, as the rabbit and sheep, the pancreas was proportionately small and difficult of access. The operation was always performed under antiseptic precautions, with the exclusion of the spray, and the typical orthodox dressing. The abdomen was always shaved and disinfected with a solution of corrosive sublimate, ether was used as an anæsthetic. The abdominal incision was made through the linea alba, from near the tip of the xiphoid cartilage to the umbilicus.

The omentum major was either pushed upward, or, in the majority of cases, an opening was made into it by tearing at a point opposite the external incision. The guide to the pancreas was always the pyloric orifice of the stomach—after the index finger had reached this point, it was passed along the duodenum for three or four inches, when the bowel was grasped between the index finger and thumb and brought into the incision with the pancreas. If any considerable prolapse of the viscera was made necessary to accomplish the object for which the operation was made, the exposed organs were carefully protected with a compress of gauze wrung out in a warm weak solution of corrosive sublimate (1:2000). Irrigation of the external wound and the protruded organs was frequently resorted to with the same solution, to cleanse the parts of blood, and to preserve the wound in an aseptic condition. A good light and an empty stomach facilitated the operation greatly.

It was always found difficult to detach the pancreas from the duodenum without incurring a considerable and often dangerous loss of blood. To prevent this occurrence most effectively, blunt dissection and direct compression with a moist, hot, aseptic sponge, proved the most effective measures; when large vessels were to be divided double prophylactic ligation was often resorted to. After completion of the operation the pancreas and duodenum were thoroughly cleansed and dried, and the toilet of the peritoneal cavity made with care, the abdominal incision was closed with interrupted sutures, introduced in the usual manner so as to include the peritoneum. The external wound was sealed with a small compress of iodoform cotton repeatedly saturated with iodoform collodium. At the end of a week the sutures were removed. Primary union of the abdominal incision was the rule, only in a few instances was healing of the wound accomplished by granulation. Ventral hernia was observed in a number of cases.

Complete Section of the Pancreas.

Complete section of the pancreas was made an object of experimentation, to ascertain whether the continuity of the pancreatic duct would

be restored after complete division and subsequent accurate coaptation, and to study the process of repair between the divided ends of the pancreas. The section was made transversely, and, after arresting all hemorrhage, the margins of the wound were brought into accurate contact with deep catgut sutures, which were made to embrace the entire thickness of the organ.

EXPERIMENT I.—Dog, four and a half months old; weight, 35 pounds. Operation performed August 23, 1885. Complete division of pancreas transversely through the middle portion; vessels ligated with fine catgut, the hemorrhage being arterial from the gastro-splenic, and venous from the duodenal end. Cut surfaces brought together accurately with thin catgut sutures, which were passed through the entire thickness of the organ, about one-third of an inch from the margins of the wound. Animal showed no signs of suffering or disease after the operation, but lost four pounds in weight during the first eight days. After this time the animal again began to increase in weight. Highest temperature 104° F., on the fourth day. Animal killed December 6, 1885, 105 days after the operation.

An examination of the pancreas showed that union had taken place between the two ends by means of a narrow cicatrix, which was indicated by a slight constriction at the site of section. Duodenal portion of gland presented a normal appearance, as the section had been made on the splenic side of the common duct. Gastro-splenic end somewhat atrophic and sclerosed. Pancreatic duct patent to cicatrix, where the principal duct of splenic portion was completely obliterated. No dilatation of duct in splenic end.

EXPERIMENT II.—Adult dog, medium size; complete section of pancreas through the junction of the middle with the splenic end. Only artery from splenic end required ligation. Immediate coaptation by means of three catgut ligatures passed through substance of gland. Animal remained well after the operation; appetite unimpaired. Dog was killed three weeks after the operation; abdominal wound completely healed; at point of section slight adhesions to neighboring organs. Visceral wound healed by a linear cicatrix of young connective tissue. Pancreatic duct completely obliterated at site of operation.

REMARKS.—These operations would tend to show that complete division of the pancreas, if not complicated by other and more serious lesions, is not a dangerous accident, if the only source of danger, hemorrhage, is met by proper surgical treatment. The coaptation of the divided ends would be desirable, but is not essential, as the continuity of the duct is not restored after this injury. No disturbance of digestion was observed in either case, as an adequate amount of pancreatic juice was secreted from the portion of the gland which remained in communication with the lumen of the intestine. As in both of these instances a greater or less amount of pancreatic juice must have escaped into the peritoneal cavity from the cut surfaces, and perhaps later from the divided duct of the splenic end, we have thus early evidence of the innocuity of extravasation of pancreatic juice into the peritoneal cavity. The process of repair was in both instances accomplished by the interposition between the divided and coaptated ends of a linear cicatrix.

Although accurate approximation was effected by three sutures, transfixing the entire thickness of the gland by passing the needle from be-

fore backward on one side, and from behind forward on the other, it seems that primary union between the divided ends failed to take place, and that the process of repair was accomplished by connective tissue proliferation, from the connective tissue on the surface of the wound, a process necessarily accompanied by a simultaneous degeneration of the parenchyma of the gland, over an area corresponding to the seat of cicatrization.

Microscopical examination of the sections made in close proximity to the cicatrix, showed various degrees of degenerative changes in the cells of the parenchyma, with a corresponding space of connective tissue proliferation.

Complete section of the duct, even when the ends are kept in accurate coaptation, appears to result uniformly in the obliteration of the duct at the site of section. The obliteration is the direct result of the formation of a cicatrix in the lumen of the duct from the cut surfaces. In both specimens the length of the cicatrix, consequently the extent of impermeability of the duct, correspond to the length of the cicatrix interposed between the divided ends of the gland.

The practical deductions to be obtained from these experiments are: that in transverse visceral wounds of the pancreas, the most important indication that presents itself, is to arrest hemorrhage by ligating the bleeding vessels, and to resort to suturing of the severed organ with a view to retain both ends of the pancreas as nearly as possible in their normal location, and thus maintain as nearly as possible the integrity of the vascular supply, rather than with a purpose to obtain restoration of continuity of the divided pancreatic duct, which, if it could be accomplished, would preserve the physiological importance of the detached portion of the gland. By the detached portion of the gland, I mean that portion which no longer remains in physiological connection with the intestine, and which never regains its physiological importance after the duct has become obliterated by a cicatrix at the point of section.

Laceration of the Pancreas.

Having observed that complete section of the pancreas is followed by severe hemorrhage, both arterial and venous, which undoubtedly might prove a source of no inconsiderable danger in cases of similar wounds of the organ in man, the following experiment was made to ascertain the extent of hemorrhage after laceration of this organ, without the intervention of treatment.

EXPERIMENT III.—Large adult cat; weight, $7\frac{1}{2}$ pounds. Abdomen opened through the median line, the pancreas exposed and detached sufficiently from the duodenum at the junction of the middle with the duodenal end, where it was torn completely across and the bleeding ends dropped into the abdominal cavity; the wound was closed in the usual manner.

The hemorrhage was noticed to be much less than after section. Highest

temperature 104.6° F., two days after operation. No symptoms of hemorrhage or peritonitis. Oct. 11, sutures were removed, the abdominal incision having apparently closed. Oct. 17, the wound opened, and it was reported that one end of the pancreas had protruded from the wound. The prolapsed viscus and wound were disinfected, the organ replaced, and the opening closed with sutures.

The animal did not appear to be very ill, but died two days later. At the autopsy no effusion was found in the peritoneal cavity and no signs of general peritonitis. A portion of the duodenum appeared gangrenous. The lacerated end of the splenic portion was adherent to the duodenum at a point two inches below the pyloric orifice of the stomach. The duodenal portion was very much atrophied and drawn up toward the splenic portion, and united to it by an extensive mass of cicatricial tissue. On opening the pancreatic duct from the duodenum, no communication could be found between it and the gastro-splenic portion of the gland.

Death in this case resulted in the accidental reopening of the abdominal wound. The prolapsed organ was, in all probability, the duodenum and not the pancreas; the gangrene of the intestine undoubtedly was caused by the prolapse and strangulation before the bowel was replaced. The laceration of the pancreas was made at a point where the two ducts meet; hence the impermeability of the duct in the gastro-splenic portion of the pancreas. Hemorrhage was arrested spontaneously, and the process of repair, so far as the wound in the pancreas was concerned, appeared to be satisfactory. The divided ends were displaced considerably immediately after the laceration, but were subsequently brought into close contact by the cicatricial contraction.

Comminution of the Pancreas.

It has been asserted by a number of authorities that dead pancreatic tissue is a highly putrescible substance, and on this account its presence is very liable to serve as a source of infection.

Believing that putrefaction can never occur without the specific germs, even in the case of dead and highly putrescible substances, the following experiments were made to test the correctness of this assertion :

EXPERIMENT IV.—Maltese cat; weight, 3½ pounds. Operation September 18, 1885. The pancreas, with its vessels, was completely detached from the duodenum to the extent of two inches, about the middle of the gland. The isolated portion was completely crushed between the blades of a sequestrum forceps. No hemorrhage whatever occurred, and the organ was dropped into the abdominal cavity. The day after the operation the temperature rose to 105° F., but the next day it was normal, and remained so until the killing of the animal, December 13, eighty-six days after the operation. No evidences of diffuse peritonitis, only slight adhesions where the gland had been crushed. The duodenal portion was atrophied and drawn toward the gastro-splenic portion, to which it was united with a firm cicatrix, which united the two ends of the gland to the duodenum, thus completing the mesenteric attachment of the bowel. The cicatrix showed a line of pigmentation throughout its entire thickness. The crushed portion of the gland had disappeared entirely by absorption, and its place was occupied by a firm cicatrix, which, by contraction, had approximated both portions of the gland. The crushing was done below the point of entrance of the pancreatic duct, which caused the atrophy of the

duodenal portion, which was no longer in physiological connection with the duodenum.

EXPERIMENT V.—Young cat; weight, $2\frac{1}{2}$ pounds. Pancreas brought into the abdominal incision, with a loop of the duodenum, and without separating it from the bowel it was crushed at its middle to the extent of two inches between the blades of a sequestrum forceps. No hemorrhage followed the procedure, and the organ was dropped back into the abdominal cavity. The animal had been in bad condition before the operation, and died seven days later. At the autopsy the abdominal incision was found closed. No peritonitis or effusion. Crushed portion showed no signs of suppuration, but appeared thicker and shorter than after the crushing, a change which was attributed to the infiltration of the dead tissue by leucocytes and connective tissue proliferation. The two ends of the glands were brought into closer contact by contraction of the recent cicatrix, which had also the effect of doubling the duodenum upon itself.

REMARKS.—In both instances the crushed parenchyma of the organ was promptly removed by absorption, which seems, in this particular locality, to proceed with unusual activity, an occurrence which can only be explained by the assumption that the peritoneum is active in this process. No infection took place, and no evidences of putrefaction could be found. Should wound infection take place in cases of this kind, there can be no doubt that the dead pancreatic tissue would serve as a most favorable soil for the septic germs, and would thus create the most essential condition for rapid and most dangerous form of infection.

These experiments also serve to demonstrate that subcutaneous crushing or comminution of the pancreas is in itself not a fatal or even dangerous injury. Subcutaneous comminution can only prove dangerous by the site of the injury, as when, for instance, the crushing takes place at or near the outlet of the pancreatic duct, where, from cicatricial contraction, obstruction of the duct takes place which would interfere with the normal escape of pancreatic juice from the intact portion of the gland. If the comminuted tissue remains in an aseptic condition, it is removed by absorption, and the loss of substance is at least partially replaced by connective tissue, which forms a bridge between the intact portions of the gland. Subsequent degeneration, atrophy, and sclerosis take place in that portion of the gland which is no longer connected with the intestine by a permeable duct.

Complete Extirpation of the Pancreas.

A diversity of opinion still prevails among physiologists in regard to the immediate and remote effects of complete extirpation of the pancreas, or an artificial sudden suspension of its functions. The results obtained by different experimenters have led to diverse conclusions. Some claim for the pancreas an essential part in the process of digestion, while others affirm with equal positiveness that the gland can be removed or rendered physiologically incompetent without impairing digestion. Bernard found that extirpation of the pancreas in birds produced death by marasmus in eight or ten days (*Mém. sur le Pancréas*, p. 157).

Berard and Colin removed the pancreas in a duck, and, on examining it six months later, found the site of the pancreas occupied by a thin layer of fat, which contained a few reddish nodules. No connection could be traced between them and the intestine. In pigs, part of the pancreas lies upon the portal vein, and the authors therefore removed only the portion adjacent to the duodenum. In one animal which died a few weeks after the operation from accidental causes, they found, in place of the portion of the pancreas removed, a cyst, the size of a hen's egg, which had no communication with the duodenum, and was filled with a fluid which, like pancreatic juice, was coagulated by alcohol. In a second case operated upon in a similar manner, the weight of the animal increased in five and a half months twenty-five kilogrammes. When the animal was killed, only a trace of the pancreatic duct could be discovered.

The portion of the gland left had undergone atrophy, and contained no ducts. The atrophied portion was eight to ten centimetres distant from the duodenum, and on section gave evidence of having undergone sclerosis. In five young dogs the pancreas was extirpated, leaving only that portion which lies upon the portal vein. All the animals remained well at the end of eight months. Three of the dogs were killed. In two of them the autopsy showed that the terminal extremity of the pancreatic duct remained as a blind pouch. The part of the gland left had become very much atrophied, and remained isolated from the duodenum. A glandular structure as large as a bean was found near the duodenum in both dogs; in one of them a duct connected this body with the bowel, while in the other no such connection could be traced. Taking it for granted that these small bodies were composed of pancreatic tissue, their weight being only about one-ninetieth part of the whole gland, the amount of secretion from them would not have been sufficient to emulsify the fats. In the third dog no trace of the pancreas could be found, and yet the animal's digestion and health appeared to be normal. The feces contained no undigested fat. From these and other experiments of the same kind, the authors came to the conclusion that the presence of the pancreatic juice is not essential in the process of digestion or absorption of fat in herbivorous, carnivorous, or omnivorous animals, or in birds.

Schiff brought about complete suspension of the function of the pancreas in animals without removing any part of the organ by injecting the ducts of the gland with melted paraffin, which, at the temperature of the body, became a solid mass, completely obstructing the outlets for the secretion. Animals treated in this manner showed no signs of derangement of digestion, and were able to assimilate fat as well as healthy animals.

The following experiments were made to ascertain the feasibility of complete extirpation of the pancreas, and the effects of such a procedure

upon digestion and assimilation. In all of the experiments the entire organ was removed. The hemorrhage was always profuse, and required numerous catgut ligatures for its arrest.

The larger vessels between the duodenum and pancreas were carefully isolated and removed with the gland, so that the intestine was deprived of its direct vascular supply over an area corresponding to the extent of the attachment of the pancreas.

EXPERIMENT VI.—Brown dog, four and a half months old; weight, 32 pounds. The entire pancreas was extirpated, part of the dissection was made with Paquelin's cautery. Temperature on second day 104° F., on fifth day 101½° F. (subnormal). On the fourth day diarrhœa set in: stools contained undigested food and free fat, and on the seventh day blood. On the ninth day the animal died. During the first few days the appetite remained unimpaired, but when the diarrhœa supervened food was taken only sparingly. At the autopsy it was ascertained that the animal had lost five pounds in weight. The abdominal cavity contained a considerable quantity of bloody serum, and the peritoneum presented evidences of recent diffuse peritonitis. The duodenum showed several dark spots on its convex surface, which might be taken for beginning gangrene. The pancreatic duct, traced from within the duodenum, was found closed at the point of section by a cicatrix upon the outer surface of the bowel.

Whether in this case the diarrhœa resulted from the absence of the pancreatic juice or from the septic peritonitis, would be difficult to determine. The duodenum had been detached from its mesentery at least ten inches, and yet the gangrene, if any, after nine days was limited to a few circumscribed patches.

EXPERIMENT VII.—Large black dog, four months old; weight, 48 pounds. Experience had proved that the separation of the pancreas and its vessels from the duodenum could be done more safely, and with less risk of hemorrhage, by tearing the tissues instead of using the scissors or knife, employing the cutting instruments only when it was thought imprudent to use too much violence in separating strong connecting bands, which would not yield to gentle force. In this case twelve ligatures were required to arrest the hemorrhage, in later experiments a much smaller number were found sufficient to arrest the bleeding, after I had learned to rely more freely on the tearing method in partial and complete extirpation of the pancreas. This dog never recovered fully from the operation and died on the fourth day, the temperature having remained subnormal during the whole of this time. At the autopsy a perforation in the duodenum was found on the convex side about five inches below the pylorus; recent peritonitis, which was undoubtedly produced by extravasation consequent upon the perforation; gangrene of the bowel, circumscribed and limited to the seat of perforation, and a few other small spots on the convex surface of the bowel. Pancreatic duct at point of section not closed.

In this case death was directly attributable to gangrene of the duodenum, caused by the extensive detachment of its mesenteric vascular supply.

EXPERIMENT VIII.—Large adult cat. The operation occupied more than half an hour, and was attended by considerable hemorrhage from the deep attachments of the gastro-splenic end. The bleeding was finally arrested by ligating a number of vessels in the region of the spleen. The animal never rallied from the operation and died five hours later with symptoms of hemor-

rhage and shock combined. On opening the abdomen no blood was found in the peritoneal cavity, except a few flat coagula which covered the denuded surface of the bowel, which extended seven inches in length.

EXPERIMENT IX.—Adult female cat. The extirpation was again attended by free hemorrhage, and the animal died half an hour after the completion of the operation, with symptoms of hemorrhage and shock.

EXPERIMENT X.—Adult black dog; weight, 33 pounds. Animal remained comparatively well for two days, when peritonitis supervened, which proved fatal on the fourth day after the operation. Wound closed; peritoneal surfaces separated with some difficulty. The abdominal cavity contained a quart of purulent fluid. At the same time, diffuse general peritonitis had given rise to extensive adhesions between the different abdominal organs. The duodenum appeared quite vascular and showed no signs of gangrene.

EXPERIMENT XI.—Medium-sized adult cat. After the extirpation of the entire pancreas, the duodenum was found on measurement to have been denuded of its mesenteric attachment to the extent of seven inches. The venous oozing proved free, and could not be completely arrested during the time which it was deemed prudent to keep the abdominal organs exposed to the atmospheric air. The animal never rallied from the operation and died two hours later. On opening the abdominal cavity, a considerable quantity of fluid venous blood was found. In this case death was caused by uncontrollable venous hemorrhage.

REMARKS.—It will be seen that of six animals subjected to complete extirpation of the pancreas, in all of them death occurred from a few hours to nine days after the operation. The cause of death was either the primary effects of the traumatism, hemorrhage, and shock, or from secondary pathological lesions traceable directly to the operation, as may be readily gleaned from the following table:

No.	Animal.	Time of death.	Cause of death.
1	Dog,	Nine days,	Peritonitis.
2	"	Four days,	Gangrene of duodenum.
3	Cat,	Five hours,	Hemorrhage and shock.
4	"	Half an hour,	" " "
5	Dog,	Four days,	Purulent peritonitis.
6	Cat,	Two hours,	Hemorrhage.

This table shows that the operation on cats proved more dangerous than on dogs, and of the three animals all died within five hours from the immediate effects of shock and hemorrhage. The three dogs died of peritonitis within from four to nine days. In one case the peritonitis was due to perforation, in the remaining two it was produced either through the wound or the pancreatic duct, which was found open in one of the cases. The complete extirpation of the pancreas necessitates such an extensive separation of the intestine from the mesentery, that this alone constitutes a great source of danger, as gangrene may take place. It is important to repeat that in the two specimens which showed evidences of gangrene this was observed on the convex surface of the bowel, and in neither case did it involve the entire diameter of the intestine. It requires no explanation to show that in

cases of this kind the collateral circulation is established first on the concave side, where the vascular supply is nearest and the force of the circulation most vigorous. In dogs and cats the pancreas is attached so intimately and extensively to the duodenum that complete extirpation is necessarily attended by profuse hemorrhage which often was found difficult, and in one instance impossible, to control. Ligation of some of the bleeding points was often found impossible, as any attempt in seizing the vessel necessarily grasped the muscular coat of the bowel, which it was thought to be dangerous to include in the ligature, as it might give rise to perforation. Steady pressure with a sponge wrung out of a hot, weak solution of corrosive sublimate was found to be the most reliable means in arresting troublesome oozing. None of these experiments was sufficiently successful to study the effect of complete extirpation of the pancreas upon digestion and assimilation.

In a number of the autopsies, however, the lacteals contained a milky fluid, showing that at least a portion of the fatty food had been emulsified by other secretions. As a final conclusion, I do not hesitate to affirm that in dogs and cats complete extirpation of the pancreas is always followed by death, either from the primary effect of the operation, or the secondary consequences following it.

Partial Extirpation of the Pancreas.

Partial extirpation of the pancreas implies a less degree of traumatism, and consequently less danger of causing serious nutritive changes in adjacent organs than complete extirpation, and for these reasons it is less dangerous, in a strictly surgical sense. Physiologically, a partial extirpation of the organ may imply the same consequences as complete extirpation, as when the portion of gland removed embraces the common duct or both principal ducts from each portion of the gland.

EXPERIMENT XII.—Adult cat; weight, $6\frac{1}{2}$ pounds. Pancreas drawn into the abdominal wound with the duodenum, and separated from the bowel to the extent of two inches, at a point corresponding to the middle portion of the gland. This section of the gland, which included the termination of the ducts, was excised with Paquelin's cautery; only one artery from the gastro-splenic end required ligature; ends of gland dropped into abdominal cavity. The temperature remained subnormal, 102° F., until the animal died, two days after the operation. At the autopsy, gangrene and perforation of the duodenum were found at a point corresponding to the site of resection.

EXPERIMENT XIII.—Scotch terrier; weight, $25\frac{1}{2}$ pounds. Ligated pancreas at its middle, with catgut, and extirpated the gastro-splenic portion; eight ligatures were required to control the hemorrhage and about four inches of the duodenum were denuded of its mesentery. Second day after the operation the temperature was 100.4° F., which became normal (103° F.) on third day. During the first week the animal gained one pound in weight, showing that digestion was not disturbed by the absence of the pancreatic juice during this time.

Three weeks after the operation the dog began to lose flesh; the emaciation was progressive until the animal died of marasmus seventy-six days after the operation. During this time the appetite was not impaired, and at no time

had diarrhœa been observed. The organs of the chest were found in a normal condition. The abdominal wound was firmly united. A few adhesions between the omentum and parietal peritoneum. No signs of peritonitis. The parenchyma of the duodenal portion of the gland had disappeared completely by absorption, only the connective tissue and the duct, somewhat dilated, remaining. The idea that degeneration and absorption of the parenchymatous structure of the gland were caused by local anæmia could not be entertained for a moment, as the connective tissue frame of the gland was freely supplied with numerous and large vessels. The portion of the duodenum stripped of its mesentery was repaired by a vascular strip of connective tissue, which restored the continuity of the mesenteric circulation. The common pancreatic duct was found obliterated at its point of entrance into the bowel, where it had been divided during the operation.

EXPERIMENT XIV.—Adult cat; weight, 6 pounds. Extirpation of gastro-splenic and half of the duodenal portion of the pancreas, with separation of duodenal mesentery to the same extent. The portion of the gland which remained was not ligated. The animal rallied from the immediate effects of the operation, but died eighteen hours later in convulsions. At the autopsy the mucous membrane of the duodenum in the portion of the bowel which had been deprived of its direct vascular supply, presented a cyanosed appearance, but no distinct signs of gangrene. Abdominal cavity contained no fluid of any kind; peritoneum normal in appearance. Slight hemorrhage between peritoneum and transversalis fascia.

EXPERIMENT XV.—Large adult dog; weight, 48 pounds. Extirpation of two-thirds of the pancreas with the common duct, leaving only a portion of the remote end of the gastro-splenic portion. The hemorrhage, which was profuse, was carefully arrested, and the pancreas ligated before section. The first two days the temperature was subnormal, 101°–102.2° F. On the third day it became normal and remained so. The animal remained in perfect health for four weeks, when he commenced to lose flesh. Appetite voracious. No diarrhœa, but stools contained undigested fat. Although the animal ate as much as four dogs of similar size, emaciation continued, and had become extreme when the dog was killed, 126 days after the operation. At the autopsy the abdominal incision was found adherent to the mesentery. The duodenum which had been stripped of its mesentery was found free, without a mesenteric attachment, but freely supplied with blood by two large vessels running through a band of connective tissue adherent to the bowel on the concave denuded side. The vessels were in communication with the adjacent intact mesenteric vessels, and served to complete the interrupted mesenteric circulation. The gastro-splenic portion of the gland which was left behind was found completely atrophied; in its centre the duct could be seen dilated to the size of a leadpencil, and distended by a clear transparent fluid. The dilated duct had no communication with the bowel.

REMARKS.—As in all of these experiments the common ducts were removed with the excised portion of the pancreas, it left the animal physiologically in the same condition as after complete extirpation of the organ, as no pancreatic juice could find its way into the intestine. In Experiments XIII. and XV. the dogs lived for a sufficient length of time to determine the influence of the pancreatic secretion upon digestion and assimilation. In both of these animals the general health and nutrition remained unimpaired for four weeks, when emaciation, with fatty stools, followed, which resulted in death from marasmus in one, after seventy-six days, and reduced the second dog to a skeleton in one hundred and twenty-six days. As from the beginning no pancreatic juice found its way into the intestine, it is difficult to account for

the satisfactory condition of digestion, and the appearance of health of the animals for the first four weeks, followed by a progressive marasmus and increase of appetite. It is true that by the resection of the mesentery of the duodenum intestinal absorption was correspondingly diminished, but marasmus from this source ought to have manifested itself soon after the operation. It is now generally conceded that a healthy pancreas will absorb its own secretion in case there is any obstruction to prevent the normal escape of the pancreatic juice, and it may be that pancreatic juice entering the circulation in this manner may have some as yet unexplained action on digestion. Should this be the case, we might assume that the pancreatic tissue left behind continued to secrete until the parenchyma was incapacitated by degenerative changes to perform this function.

All of the experiments made on the pancreas tend to prove that any portion of the gland when it becomes detached from the bowel, invariably undergoes degenerative changes, and that its parenchymatous structure disappears by absorption within a few weeks. In these cases we may safely assume that the remaining portion of the gland had been rendered physiologically incompetent during the first four weeks, the time during which the animals remained in a healthy condition. In Experiment XV. almost the entire duodenum had been suddenly deprived of its vascular supply, and yet no gangrene occurred. The collateral circulation was established by the development of two large vessels in a band of cicatricial tissue along the concave surface of the bowel, which restored the interrupted circulation between the mesenteric vessels on each side of the resected portion of the mesentery. It is also important to mention that in both dogs the lacteals appeared empty at the autopsy. These experiments would then tend to prove that the pancreatic secretion is an important, if not essential, digestive fluid, and that in cases where no pancreatic juice can enter the intestine, or where the secretion is entirely suspended, digestion and assimilation become impaired, in all cases where the supposed vicarious action of other organs is inadequate to perform the functions of the extirpated or degenerated pancreas.

Obliteration of the Pancreatic Duct by Elastic Constriction.

A favorite method of studying the effect of exclusion of the pancreatic juice from the digestive tract has been ligation of the pancreatic duct. Against the reliability of these experiments it may be urged that in many animals the pancreas possesses more than one duct, and in some of them accessory ducts may be present, which in all probability would be overlooked in the operation, and thus complete exclusion would not be secured. In some of the smaller animals even the common duct is often found only after a prolonged and patient search, consequently any additional ducts or ductlets would be very likely to escape the attention

of the operator. Rabbits have, as a rule, only one duct, which enters the intestine eight to ten inches below the pyloric orifice of the stomach; on this account the results obtained by experiments of ligating the duct have been most reliable when this animal was taken as an object for experimentation.

Amozan and Vaillard (*Pancréas du Lapin, Journ. de Méd. de Bordeaux*, April 3, 1881) tied the pancreatic duct in rabbits, and studied subsequently the histological changes in the pancreas. Animals that survived the operation, and were killed after eight days, were considerably emaciated. On examining the pancreas it was found, as in the parotid gland, after tying its duct, that an excessive amount of connective tissue had formed in and around the lobules, that the ducts were much dilated, and the epithelial lining partly thrown off; the epithelial cells had changed in position and form, and appeared atrophied. A careful microscopical examination of the specimen showed that ligation of the duct of Wirsung produced a gradual transformation of the pancreas into connective tissue; the first effect is an enormous distention of the duct which extends to the most remote portions of the gland. The epithelial cells become detached, and with a colloid material present, lead to obstruction in the ducts. The gland cells, even as early as twenty-four hours after ligature, become translucent. After a few days the nuclei become swollen, and divide into two or three parts, which fill the interior of the cell. After seven to nine days, the place of the cells is occupied by free nuclei and round and spindle-shaped cells, which are transformed into connective tissue. In the neighborhood of some of the veins collections of colorless corpuscles could be seen. The gland, on the whole, had undergone cirrhotic atrophy.

According to Charcot and Gombault the same cirrhotic change is produced in the liver, by ligating the bile-ducts, while ligation of the ducts of the salivary glands and the ureters of the kidney produces only slight or no cirrhosis of those organs.

Bérard and Colin (*Gaz. hebdomadaire*, vi. 4, 1858) ligated the pancreatic duct in dogs which had fasted for several days, and then fed them well for twenty-four hours. The animals either showed no appetite, or, after eating, ejected the food from the stomach. If the animals were killed the lacteals were either only partially filled with a milky fluid, or, more generally, they were found empty.

The authors then tied the pancreatic duct in sixteen dogs which had fasted four or five days, and immediately injected into the duodenum a quantity of oil and lukewarm water. The animals were killed three or four days afterward, and the lacteals were found to contain a white opaque chyle both in the mesentery and walls of the intestine.

Cohnheim (*Allgemeine Pathologie*, Berlin, 1882) claims that digestion is performed in a remarkably satisfactory manner, even in case the pan-

creatic juice is entirely absent, in the intestinal tract. He claims that the presence of fatty stools is the only symptom which can be positively brought in connection with a defective or total absence of pancreatic secretion. He asserts that in rabbits it is not difficult to ligate the pancreatic duct, and that in cases where this is done, with the exception of a loss of appetite for a few days, the animals suffered no bad consequences, and in a few days were as well as before the operation.

Langendorf ascertained by experiment that in pigeons a few days after obliteration of the ducts of the pancreas, the desire for food increased, but they emaciated progressively, because, as the author asserts, the carbohydrates were not digested. Cohnheim is of the opinion that in other animals the capacity of other organs to assume vicarious action is greater than in birds. Other digestive fluids perform the function of the pancreas. The transformation of starch into glucose is accomplished by the intestinal juice, and the emulsifying action of the pancreatic juice is assumed by the bile. The remnants of undigested peptones are removed by way of putrefaction induced by bacteria, which are always present in the intestinal tract. That the pancreas continues to secrete after ligation of the common duct has been demonstrated in Heidenhain's laboratory, where, thirty days after the duct had been ligated, normal pancreatic juice escaped through a canula introduced into the duct. The quantity was only slightly less than from a normal gland, and the discrepancy was readily explained, as some of the gland structures must have been destroyed by the increased pressure in the duct from the accumulated fluid. As the organ continues to secrete, and the space for accumulation is limited, the only logical conclusion which can be arrived at is that the secretion is removed by the bloodvessels and lymphatics in the gland. It has been shown by Kühne that the introduction of pancreatic juice into the circulation does not act deleteriously, as he injected one of its most active constituents—trypsin—directly into a vein without any immediate or remote ill effect upon the animal. As he detected this substance in the urine, it is reasonable to assume that the ferments of the pancreatic juice which have not been neutralized by deoxidation into the more innocuous zymogen are eliminated with the renal excretions.

The following experiments were made, not so much to determine the effect of ligation of the pancreatic duct upon digestion, as with a distinct purpose of studying the effects, in the gland and its duct, which would follow sudden obstruction in the duct. Instead of resorting to direct ligation of the duct, the same object was accomplished with greater certainty and more ease by resorting to elastic constriction by using a rubber tube or band which was made to include the entire pancreas with or without its vessels. In every instance the elastic constriction produced complete division of the organ and its duct in a short time, and the

elastic ligature was usually found encysted either at the site of application or a little distance from it.

EXPERIMENT XVI.—Adult black dog; weight, 30 pounds. Pancreas and duodenum were drawn into the abdominal incision, and a fine rubber drainage tube was passed between the duodenum and the pancreas at the junction of the middle with the proximal third, and firmly tied. The knot was kept from unfastening by transfixion with a silk ligature. The vessels were included in the rubber ligature. The animal remained perfectly well after the operation and gained three and a half pounds in ten days. The dog was killed forty-nine days after the operation. On examination it was found that the abdominal wound had healed completely; slight adhesions between omentum and the lower portion of the cicatrix. The rubber ligature was found encysted at the junction of the middle with the proximal third (splenic end). The duodenal portion and the distal portion of the gastro-splenic end were unchanged, as the secretion could enter the intestine through the patent common duct. At the point where the ligature had been applied, the organ, with its duct, had been completely divided, the point of section being indicated by a contraction due to cicatrization. The duct in the isolated splenic portion was slightly dilated; parenchymatous tissue in a state of degeneration; well-marked sclerosis.

EXPERIMENT XVIIa.—White and yellow coach dog, four and a half months old; weight, 32 pounds. In this case the rubber ligature was applied about the middle of the gland, including the artery, but not the vein. The animal remained in excellent health, and was killed ninety-eight days after the operation. At the autopsy the ligature was found encysted in a firm capsule about the middle of the gland. It had completely divided the pancreas and the duct of the splenic portion on the proximal side of the common duct. The duct in the isolated portion was considerably dilated throughout, and completely obliterated at the point of ligation. This portion of the gland had undergone parenchymatous degeneration and sclerosis, as the tissue was quite firm and grated on being cut with the knife. The portion of the gland remaining in communication with the intestine through the common duct presented a normal appearance.

EXPERIMENT XVII.—Adult black dog; weight, 20 pounds; ligation of pancreas on the proximal side of the common duct, excluding the artery. The dog remained perfectly well after the operation, gained considerable flesh, and was killed in four weeks. The rubber ligature was encysted between the duodenum and pancreas. Complete division of pancreas and duct on the splenic side of the common duct. Slight dilatation of the duct in isolated portion, with the same tissue changes as in the preceding case.

EXPERIMENT XVIII.—Adult black cat; weight, $5\frac{1}{2}$ pounds. The pancreas was detached from the duodenum to the extent of three-quarters of an inch, and the rubber ligature applied so as to exclude the artery. On the second day the temperature rose to 106° F., but the general condition of the animal was undisturbed. The fever soon subsided, and digestion and nutrition were at no time impaired. The cat was killed thirty-eight days after operation. The ligature was found encysted between the pancreas and duodenum on the distal side of the common duct. Complete division of the pancreas and obliteration of the duct by a linear cicatrix. The detached mesentery was united with the bowel. The detached duodenal portion of gland had almost disappeared by absorption, only connective tissue and vessels being left to indicate the contour of the gland.

EXPERIMENT XIX.—Adult white cat; weight, $6\frac{1}{2}$ pounds. Detached pancreas and vessels from duodenum to the extent of an inch and a half, and applied a rubber ligature about the middle of the gland, including the vessels. Next day the temperature was 105° F.; later, normal. No disturbance of digestion or nutrition. The cat was killed eighty-five days after operation. The rubber ligature was encysted between duodenum and pancreas on distal side of the common duct. Complete section of pancreas and ob-

literation of duct. The duodenal portion had almost completely disappeared by absorption; the connective tissue of the gland, the dilated ducts, and the abundant vascular supply, served to indicate the outlines of the atrophied portion. Mesentery of the duodenum was perfect.

EXPERIMENT XX.—Young black cat; weight, 2 pounds. Isolated pancreas to the extent of two inches from intestine, and included the detached portion between two silk ligatures, firmly tied. Temperature was high on second and sixth days. Animal died on sixth day. Abdominal wound was firmly united. On opening the abdominal cavity no effusion was found. No general peritonitis. Abscess between duodenum and liver; ligated portion detached; gangrenous; ligatures not encysted. Abscess in communication with pancreas. Acute atrophy of the entire pancreas. No gangrene of duodenum. In this case the suppurative process started from the portion of pancreas which had been included between the ligatures. We shall find that when infection does not take place, even dead pancreatic tissue is amenable to absorption.

EXPERIMENT XXI.—Old cat; weight, 4 lbs. Detached gastro-splenic portion of the pancreas to the extent of an inch and a half from duodenum, and applied two rubber ligatures about one-half of an inch apart, including the vessels. On the following day the cat was quite ill, without any rise in temperature. For several days vomiting was the most prominent symptom. The animal died on the sixth day. Abdominal wound united; no peritonitis; no effusion. Pancreas adherent to transverse colon: on separating the adhesion a small cyst containing about three drachms of a clear, transparent fluid was ruptured. As this cyst corresponded to the place where the ligatures had been applied, it was undoubtedly a collection of pancreatic juice which had escaped from the divided duct, and around which a connective tissue wall had formed. The ligatures had cut through the organ and duct. The ends of the gland had retracted. Duodenum healthy. Mesenteric detachment not repaired. No suppuration anywhere.

EXPERIMENT XXII.—Adult dog; weight, 39 lbs. Detached the pancreas, about its middle, from duodenum, to the extent of two inches, and applied two rubber ligatures, about one inch apart, including the vessels. On the following day, the dog appeared quite sick. Increase of temperature after sixth day; no appetite, and rapid emaciation. On the ninth day, diarrhœa, which became later dysenteric in character. Died on the nineteenth day, having lost during this time six and a half pounds in weight. Abdominal wound completely united. No general peritonitis. Pancreas and duodenum adherent to liver. Portion of pancreas between ligatures gangrenous—contained in an abscess cavity. Ligatures detached and loose in abscess cavity.

EXPERIMENT XXIII.—Adult black dog; weight, 20 lbs. Inclusion of two inches of pancreas and its vessels, after separation from duodenum, between two silk ligatures about the centre of the gland. The dog was very sick on second day, and thermometer showed an increase of temperature to 104.4° F., which continued with slight variations until the animal died on the sixth day. Wound completely united. Diffuse purulent peritonitis, and extensive adhesions. Ligated portion gangrenous and loose, with ligatures in abscess cavity between duodenum and pancreas.

EXPERIMENT XXIV.—Adult gray cat; weight, 5½ lbs. Isolated pancreas and vessels from duodenum to the extent of an inch and a half, and included this portion between two ligatures. Animal remained well for four days, when symptoms of peritonitis appeared. Died on tenth day. Wound nicely united. No peritoneal effusion. Localized peritonitis at site of operation. Ligatures and ligated section of pancreas loose in abscess between the duodenum and pancreas. Pancreatic veins thrombosed. Duct of splenic portion in direct communication with the abscess cavity.

EXPERIMENT XXV.—Adult cat; weight, 6 pounds. Pancreas with its vessels detached from duodenum to the extent of two inches, and this portion included between two ligatures. On fifth day temperature 106° F., gradual decrease subsequently to normal. For a number of days during the febrile attack, complete loss of appetite. After this, appetite and nutrition were good. Killed twenty-eight days after operation. Portion of gland between ligatures

completely disappeared by absorption. Ligatures in close proximity and encysted in firm capsule. Duodenal end atrophied, in which the dilated duct was distinctly visible. Splenic end somewhat atrophied.

EXPERIMENT XXVI.—Large Newfoundland dog; weight, 55 pounds. Rubber ligatures made to include one inch of the pancreas about its middle, with exclusion of its vessels. Slight fever on third day, subsequently no symptoms indicating disturbance of digestion or disease. Animal killed thirty-one days after operation. Intervening portion of pancreas disappeared by absorption. Ligatures encysted. Loss of substance replaced by bridge of connective tissue. Duodenal end atrophic with dilated duct. Gastro-splenic portion normal in appearance, and in direct communication with the intestine through the common pancreatic duct.

Only two of the animals recovered after isolation and double ligation of the pancreas, a fact which shows the great danger of leaving pancreatic tissue not supplied with blood in the abdominal cavity. We can only assume that the danger of infection is increased by leaving an exceedingly favorable culture substance for infective germs in the abdomen. If the operation is perfectly aseptic, the dead pancreatic tissue remains aseptic and is removed in an exceedingly short time by absorption.

EXPERIMENT XXVII.—Large adult cat. Applied a single rubber ligature on distal side of the common pancreatic duct, excluding the artery and vein. No disturbance of digestion or nutrition, and temperature normal throughout. Animal, when killed twenty-eight days after operation, had grown fat. Only a few slight adhesions at site of ligation. Pancreas and duct were completely divided and kept in contact by a linear cicatrix. Ligature was encysted between the duodenum and under surface of the liver. The gastro-splenic portion of the pancreas was normal in appearance, and connected with the common duct. The duodenal portion was atrophied; the duct slightly dilated.

EXPERIMENT XXVIII.—Large Newfoundland dog. Ligation of the pancreas and its vessels with a rubber ligature on the proximal side of the common duct. No fever, no disturbance of digestion or nutrition. Animal was killed ninety-one days after operation. On opening the abdominal cavity, the entire pancreas presented a normal appearance in size, shape, and consistence. Where the ligature was applied a narrow constriction was visible, which represented the point of section made by the ligature. Ligature was encysted in the cicatrix. On tracing the pancreatic duct from the interior of the intestine, a probe could be passed along the duct of the duodenal portion. On following the duct of the splenic portion, the probe was arrested at the cicatrix, about a quarter of an inch from the wall of the intestine. The duct at this point was completely obliterated. As in all of the previous experiments the detached portion of the gland had invariably become the seat of degenerative changes and atrophy, I was at a loss to account for the normal appearance of the gastro-splenic portion of the gland in this instance. After a prolonged and careful search a minute opening was detected in the fold of the mucous membrane surrounding the outlet of the bile-duct, and by careful manipulation a delicate probe was passed along a canal which passed obliquely through the wall of the bowel, entered the pancreas on the splenic side of the ligature, and terminated in the large duct of the gastro-splenic portion.

The explanation for the absence of atrophic changes had been found. An accessory duct had furnished an outlet for the secretion in the gastro-splenic portion, and had maintained the physiological connection between this portion of the gland and the duodenum after obliteration of the common duct of the gastro-splenic portion. It was the only instance where such a structure was detected, and the only specimen in which the normal structure of the detached portion of the gland was preserved after obliteration of the principal duct.

REMARKS.—These experiments illustrate the feasibility of ligation of either portion of the pancreas near the common duct as a surgical procedure, and the regularity with which the pancreatic tissue is removed by degeneration and absorption in the detached portion of the gland. By physiological detachment I mean a permanent interruption to the escape of secretion by section or obliteration of the duct.

After ligation of the duct or gland, secretion continues, and as the space for accumulation of the fluid is limited, a certain degree of pressure within the duct is established, as is evident from the uniformity with which the ducts throughout that portion of the gland were found dilated. In no instance, however, was anything observed which resembled a cyst. The dilatation was not limited to any particular portion of the duct, it always presented itself as a uniform ectasia of the entire duct. We can only explain the moderate dilatation by assuming that, as soon as a certain degree of pressure is reached, the pancreatic juice is removed by absorption by the vessels and lymphatics of the pancreas, and that a greater accumulation of fluid and distention of the duct could only occur when this function has become diminished or suspended by organic changes in the structures which are concerned in the removal of the secretions. The atrophic changes in the parenchyma of the detached portion of the gland have been ascribed to the pressure within the ducts upon the parenchyma cells—a sort of pressure atrophy.

This supposition lacks proof, inasmuch as the pressure at any time could not have been considerable, and as the same atrophic changes have been observed in cases where no pressure could have existed, as in cases of external and internal pancreatic fistula, where the duct remains open until secretion ceases. The atrophy can also not be due to deficiency of blood supply, as it occurred regularly and as rapidly in cases where the blood supply remained unimpaired; and in many of the specimens, illustrating complete atrophy, the abundant vascular supply was distinctly observed and noted. I am unable to furnish a satisfactory explanation of the cause of this form of atrophy. All that I can say is, that in every instance in which complete physiological detachment had been produced by ligation, resection, crushing, or any other means, this result followed without exception.

Practically this observation is of great importance, because it demonstrates that in operations upon the pancreas it is not essential or necessary to remove peripheral portions of the gland, for fear that if any of the parenchymatous structure should remain a retention cyst would follow. In partial resections for injury or disease it would be advisable to ligate the peripheral portion, and permit it to remain, as it would lessen the danger by the infliction of less traumatism, and we can confidently expect that it will be removed in a short time by absorption.

These experiments settle definitely an important pathological question.

It has been claimed by all writers that cysts of the pancreas are produced by obstruction of the common duct. In most of the specimens which have been examined, it is distinctly stated that the obstruction was not complete, as, for instance, in cases of impaction of pancreatic calculi when found in connection with cysts. In all of these experiments obstruction of the duct was sudden and complete by the elastic constriction, and subsequently permanent by the formation of a cicatrix between the divided ends of the duct.

In none of the specimens, where life was sufficiently prolonged, did the process of obliteration fail to take place, and yet in none of them was even an attempt at the formation of a cyst observed.

The experiments with the double ligature teach the importance of removing such portions of the pancreas as are not supplied with blood-vessels, rather than trust to the doubtful expedient of leaving them to be removed by absorption, as dead pancreatic tissue is an exceedingly putrescible substance, and furnishes the most favorable conditions for the growth and increase of septic germs.

External Pancreatic Fistula.

The formation of a permanent pancreatic fistula has always constituted one of the most difficult tasks in experimental physiology. Bernard (*Leçons de physiol. expér. appliquée à la médecine*, t. ii., Paris, 1855), after many fruitless attempts, declared that it was impossible to establish a permanent pancreatic fistula, for the reason that the canula invariably fell out after a few days, after which the duct again conveyed its contents into the duodenum. He found, also, that the pancreatic juice which flowed from the fistula remained normal only for twelve or sixteen hours, after which time it became thinner, and did not coagulate on the application of heat. Neither did it possess any longer the property of decomposing fat into glycerine and fatty acids. This change in the pancreatic juice always appeared as soon as inflammation was noticed about the seat of operation.

In horses and cattle this condition appeared so early, that it was found impossible to obtain pure pancreatic juice from a fistula.

The intermittent action of the pancreas was well illustrated in animals when a fistula has been established, active secretion only taking place during digestion. He ascertained that in medium-sized dogs, in an hour, not more than five or six grammes of juice could be obtained. Ether injected into the stomach increased the secretion, while vomiting suspended the flow of fluid, but not its secretion, since just after the act it was poured out in so much greater quantities. Pressure on the abdomen and the respiratory movement of the chest accelerated the flow from the fistula.

The following experiments were made for the distinct purpose of studying the functional activity of a detached portion of the pancreas, consequently a different method of operating had to be devised. Having satisfied myself that physiological detachment of a portion of the pancreas by section, resection, or ligation always results in degeneration of the parenchyma, and atrophy of the detached portion, I determined to study this subject more thoroughly by interrupting all anatomical continuity between the detached and the principal portion of the gland. An external pancreatic fistula was established by bringing the pancreas with the duodenum into the wound, ligating the pancreas usually below the common duct, dividing the gland and its vessels completely on the distal side of the ligature, arresting carefully the hemorrhage from the cut surface without interfering with the principal duct, detaching the distal, or duodenal portion sufficiently from the bowel, so as to bring the cut surface a little above the level of the outer surface of the wound, where it was fixed with four catgut sutures to the margin of the wound. The remaining portion of the wound was closed in the usual manner. This method secured a permanent pancreatic fistula, the outflow from which would indicate the amount of secretion from the detached portion of the gland.

EXPERIMENT XXIX.—Young dog; weight, 30 pounds. Ligated pancreas at junction of middle with distal portion, section of gland immediately below ligature, separation of detached portion from duodenum to the extent of two inches, implantation of free end into the lower angle of the abdominal incision with four catgut sutures. During the second day, slight rise in the temperature. During the first day the dog refused to eat, and no pancreatic juice was seen to escape from the cut surface of the gland. The second day the secretion was copious, resembling normal pancreatic juice. The discharge was intermittent, most copious a few hours after eating, and entirely absent when the animal fasted. At the end of the first week, the secretion became less in quantity, and gradually continued to decrease until it ceased entirely on the twenty-first day. The portion of the pancreas included in the wound, became smaller from day to day, and appeared to have disappeared almost entirely when the secretion ceased, leaving at this place an irregular depressed cicatrix, with no tendency to hernial protrusion.

The animal remained in perfect health and was killed seventy days after operation. At the autopsy, the cut end of the atrophic duodenal portion of the pancreas was found adherent to, and incorporated in the firm cicatrix of the abdominal wound. The parenchyma in the detached portion of the gland had disappeared completely; in the centre of this portion the principal duct could be seen dilated to the size of a lead-pencil, and it contained a clear, transparent fluid. The duct could be traced to the peripheral extremity of the gland in one direction, and into the cicatrix of the abdominal wound in the other.

The atrophic portion of the gland was freely supplied with bloodvessels. The duct was widest near the cicatrix, and gradually tapered toward the end of the gland. The cut proximal end had become adherent to the duodenum. A probe could be passed from the duodenal end of the common pancreatic duct along the entire distance of the splenic portion, the point of section had evidently been made on the peripheral side of the common duct, through the duodenal portion of the gland.

EXPERIMENT XXX.—Adult cat; weight, 5 pounds. In this case the gland was divided near the middle. The duodenal portion was detached

from the intestine to the extent of two inches, and sewed into the lower angle of the incision. Second day temperature, 105.8° F.

The animal took but little food, and only a very small amount of secretion was observed to escape from the duct on the cut surface of the gland. The cat died on the third day after the temperature had shown an increase to 106° F. At the autopsy it was shown that death had resulted from purulent peritonitis, and croupous pneumonia of right lung. No gangrene of duodenum or pancreas.

EXPERIMENT XXXI.—Adult cat; weight, 5½ pounds. Operation same as before. The animal was quite ill for three days; at the end of this time the temperature was 104.8° F.; took but little nourishment. From this time improvement took place, and finally complete recovery.

Escape of pancreatic juice first observed on second day, gradually increased for three days, when it began to diminish and ceased completely on the seventeenth day, when the wound closed completely, showing no tendency to ventral hernia. Unfortunately the animal was lost on the forty-eighth day.

EXPERIMENT XXXII.—Black shepherd dog; weight, 43½ pounds. Ligation of pancreas about its middle, double ligation of pancreatico-duodenal artery, division of gland, application of four ligatures to arrest hemorrhage from the distal portion of the gland, detachment of duodenal end to the extent of two inches from intestine and fixation of free end into the lower angle of the incision by four catgut sutures. No untoward symptoms after operation. Free escape of pancreatic juice at the end of the second day, which continued quite profuse for ten days during digestion, when it began to diminish, and ceased entirely on the twenty-fifth day after the operation. During the first six days the animal lost four pounds in weight, after this time digestion and nutrition perfect. The dog was killed forty-six days after operation. Post-mortem appearance almost identical with that in Experiment XXIX., only that the duodenum was found adherent to the under surface of the liver. The vascularity of the atrophic duodenal end was particularly well marked.

REMARKS.—These experiments have demonstrated conclusively that when a portion of the pancreas is detached by complete section, secretion continues until, by degeneration and absorption, the parenchyma of the gland has disappeared. The degeneration evidently commences at the end of eight to twelve days, and progresses rapidly and continuously until the end of twenty to twenty-seven days, when all of the secreting structures have lost their physiological function, as indicated by a permanent cessation of the flow of pancreatic juice. The existence of distention of the principal duct in these cases can only be explained by assuming that it occurs after closure of the fistula has taken place by an accumulation of secretion from the lining of the duct, or that the dilatation is caused by traction upon the outer surface of the duct by the connective tissue framework of the gland, or the contraction incident to interstitial connective tissue proliferation. That the atrophy in the part of the organ which had been detached from its connections with the intestine was not due to a traumatic interstitial pancreatitis is proved by the normal appearance and structure of the remaining portion of the gland which had retained its anatomical and physiological relations to the intestine. I am, therefore, again supported in the assertion that physiological detachment of any portion of the pancreas is invariably followed by degeneration and complete atrophy, consequently also by complete cessation of functional activity.

Internal Pancreatic Fistula.

It is a well-known fact that when pancreatic juice is brought in contact with the skin it produces irritation, an effect which has been attributed to its digestive qualities. In all the animals where an external pancreatic fistula was established, the skin appeared sore and macerated as far as it had been kept moist with the pancreatic juice.

Clinical observation has shown that in nearly all cases where a cyst of the pancreas was treated by the formation of a pancreatic fistula the skin around the fistula remained in an eczematous condition so long as the fistula continued to discharge fluid. Taking these facts into consideration, we should naturally anticipate that when pancreatic juice is brought in contact with the peritoneum it would produce a destructive effect upon it by its digestive properties, or it might be even followed by diffuse peritonitis.

In opposition to this reasoning, Bernard informs us that none of his animals died when he had made a pancreatic fistula, and as in these cases extravasation of pancreatic juice into the peritoneal cavity was almost inevitable, it would appear that its effects here are not so disastrous as when it acts upon the skin. Concerning this point, Heidenhain remarks: "The animals do not suffer from this circumstance, as the duct is regenerated in spite of the wounded surface being bathed in the secretion. Nevertheless, it is difficult to explain this. Why do not the wounded and suppurating tissues undergo digestion by the pancreatic juice? The efficacy of the albumen ferment is destroyed in some way, I presume, probably by being converted into zymogen, the living tissues having the same effect on the juice as Podolinski observed, by treating the pancreatic juice with powdered zinc or yeast ferment." As pancreatic juice, when brought in contact with the atmospheric air, may undergo rapid changes, and thus render it abnormal, experiments made with it by injecting it into the peritoneal cavity, would not represent the action of normal pancreatic juice upon the peritoneum, hence the results obtained would not represent the effects of normal secretion. To determine the effect of normal pancreatic juice on the peritoneum, I resorted to the formation of an internal pancreatic fistula, so as to bring the peritoneum in contact with the normal pancreatic secretion as it escapes from the cut surface of the gland. My experiments with external pancreatic fistula had taught me that the isolated portion of the gland continued to secrete for seventeen to twenty-six days; hence, I was convinced that if I could establish the same conditions within the peritoneal cavity, I would secure an intermittent flow of normal pancreatic juice into the peritoneal cavity for the same length of time. The operation was performed in precisely the same manner as for external fistula, except that

the cut end of the duodenal portion was detached from the duodenum, turned downward, and dropped into the peritoneal cavity.

EXPERIMENT XXXIII.—Young dog; weight, 31½ pounds. Section of pancreas near middle, detached duodenal end from bowel to the extent of three inches, turned it downward and closed the abdominal wound completely. Second day, temperature 106° F.; slight tympanitis; dog appeared quite ill for a number of days, and temperature remained above normal for a week, after which, though the animal remained in good condition until killed, seventy-six days after the operation, the autopsy showed evidences of a former local peritonitis at the site of operation; duodenal or detached end of pancreas completely atrophied, its ducts dilated, closed, and adherent to duodenum. Splenic portion normal in size and appearance; cut end adherent to duodenum; common duct pervious.

EXPERIMENT XXXIV.—Adult dog; weight, 21 pounds. Detached pancreas from its middle toward distal side to the extent of five inches. Divided the pancreas with Paquelin's cautery, between two compression forceps; used no ligatures. Turned end of lower portion downward, and closed the abdominal incision. Animal died on third day, with symptoms of peritonitis. No rise in temperature. Post-mortem examination showed evidences of diffuse purulent peritonitis; no hemorrhage; no sign of gangrene of duodenum.

EXPERIMENT XXXV.—Adult dog; weight, 37 pounds. Ligated pancreas on distal side of common duct. Divided the gland transversely just below ligature, tied vessels with catgut, detached duodenal portion from intestine to the extent of three inches, turned the free end downward and closed the abdominal incision. Temperature remained normal, but the animal was reported sick for five days, when recovery set in, and the dog remained in good health as long as he was under observation—thirty-two days, when he ran away.

EXPERIMENT XXXVI.—Adult cat; weight, 5½ pounds. Applied ligature below common pancreatic duct, and divided the gland on distal side of ligature, detached duodenal portion from intestine to the extent of two inches, turned the free end downward, and closed the abdominal wound. The animal remained well after the operation, and was in good condition when killed eighty-three days after the operation. Great omentum adherent to lower border of liver; mesentery adherent to duodenum; duodenal portion of gland completely atrophied; cut extremity of splenic portion adherent to duodenum by a firm cicatrix just below the entrance of the common duct into the intestine. This portion of the gland normal in size and appearance. Atrophied portion abundantly supplied with bloodvessels.

EXPERIMENT XXXVII.—Adult cat; weight, 5½ pounds. Pancreas was ligated just below the common duct, transverse section of the pancreas below ligature, detached the peripheral portion to the extent of an inch and a half, turned the free end downward and closed the abdominal incision. Death on third day. No hemorrhage into the abdominal cavity; diffuse purulent peritonitis; adhesions between the duodenum, liver, and greater omentum.

EXPERIMENT XXXVIII.—Young cat, same operation as in Experiment XXXVII. No serious symptoms were observed after the operation. About two weeks later progressive emaciation until the animal died forty-two days after operation. At the post-mortem, an extensive abscess was found underneath the skin over the sacrum. Some evidences of previous peritonitis, but no effusion or suppuration. Duodenal or detached portion quite vascular, but in a condition of advanced atrophy. Splenic portion was normal in size and appearance, but cut end firmly adherent to duodenum below the entrance of the common duct.

EXPERIMENT XXXIX.—Young cat. Operation the same, followed by no serious symptoms and no rise in temperature. Animal was killed seventy days after the operation. At the autopsy, the lower border of liver was found adherent to the cicatrix of the abdominal wound. Duodenal portion was completely atrophied. At the point where the duodenum was denuded of its mesentery, the bowel had become acutely flexed by cicatricial contraction which approximated the raw surfaces. The same cicatrix connected the atrophied and intact portion of the pancreas.

EXPERIMENT XL.—Adult cat; pancreas detached from duodenum to the extent of an inch and a half, otherwise operation same as in preceding cases. Rise in temperature on fourth and seventh day, otherwise the animal was in good condition. Killed forty-two days after the operation. Animal was well nourished. Great omentum adherent to cicatrix of wound.

At the point where the gland was detached from the duodenum, the bowel doubled upon itself acutely, the raw mesenteric surfaces in direct contact. The connective tissue remnant of duodenal portion is incorporated in this cicatrix but can be readily identified. Cut surface of splenic end was firmly adherent to the duodenum below the entrance of the common duct; presents normal appearance in size, consistency, and shape.

EXPERIMENT XLI.—Young cat. Operation the same as in preceding case. Temperature on fifth day, 105.5° F. Animal was killed on seventh day, wound not completely healed. Abscess on concave side of the duodenum. No peritoneal effusion or signs of general peritonitis.

EXPERIMENT XLII.—Adult dog; weight, 13 pounds. Operation same as before, mesenteric denudation of duodenum two inches. From second to eighth day slight rise in temperature. Animal in excellent condition when killed thirty-five days after operation. Small ventral hernia. A number of adhesions at site of operation. Mesenteric circulation at point of detachment restored by a plexus of new vessels, contained in a narrow band of cicatricial tissue. Duodenal portion almost completely absorbed, only a few scattered imperfect lobules visible. Splenic end normal and in communication with duodenum through common duct.

EXPERIMENT XLIII.—Adult dog; weight, 15 pounds. Operation same as in preceding experiment. No disturbance of digestion or nutrition, and no rise in temperature. Animal was in good condition when killed thirty-five days after operation. Duodenal portion indurated and contracted into a hard string which contains a dilated duct. Liver adherent to diaphragm. Duodenum without a proper mesentery over a space of several inches, vascular supply furnished by new vessels passing along the surface of the bowel on the concave side. Examination shows that ligature had been applied on splenic side of duct, and that the section had probably been made near or through the common duct, as the splenic portion was also in a state of advanced atrophy and not in communication with the bowel. The duodenal portion was in a state of extreme atrophy, much shortened, and firmly adherent to the bowel. Just below point of operation, a small encapsulated abscess was found on the convex side of the bowel.

In this case no pancreatic juice could gain entrance into the bowel, and yet digestion and nutrition appeared to be unimpaired.

No.	Animal.	Time of death.	Cause of death.
1	Dog,	76 days,	Purulent peritonitis.
2	"	3 "	Killed.
3	"	Living,	Ran away 32d day.
4	Cat,	83 days,	Killed.
5	"	3 "	Purulent peritonitis.
6	"	42 "	Abscess in sacral region.
7	"	70 "	Killed.
8	"	42 "	"
9	"	7 "	"
10	Dog,	35 "	"
11	"	35 "	"

REMARKS.—As in cases of external pancreatic fistula the secretions amounted often to more than four ounces a day, we have every reason to believe that the same quantity was secreted and discharged into the

peritoneal cavity in the cases in which an internal pancreatic fistula was established. The effect, if any, of the pancreatic juice upon the peritoneum can be seen best by an examination of the preceding table.

In only two of the eleven experiments was death caused by purulent peritonitis. In one a circumscribed abscess was found in the concavity of the duodenum, and in one animal a small abscess, with thick walls, was found on the convex surface of the duodenum, which did not give rise to any symptoms during life. One of the cats died from the consequences of a large abscess over the sacrum forty-two days after the operation. The post-mortem appearances in the abdomen pointed to only a very circumscribed peritonitis at the seat of operation. As the mortality, after the formation of an internal pancreatic fistula, did not exceed the death-rate of any other form of operation upon the pancreas, we are justified in the assertion that normal pancreatic juice, when brought in contact with the peritoneum, does not produce peritonitis.

Another question which presents itself, is this: What becomes of the pancreatic juice in the peritoneal cavity? No mention is made in the autopsy records of these cases, of the presence of any kind of effusion in the peritoneal cavity, except in the two cases where death resulted from purulent peritonitis, when the abdomen contained a considerable quantity of a sero-purulent fluid thrown out by the inflamed serous membrane. From these evidences we can only arrive at the legitimate and logical conclusion that normal pancreatic juice is promptly and rapidly removed by absorption when brought in contact with the peritoneum. The uniformity with which the detached portion of the pancreas was found atrophied, only corroborates the statements previously made when we considered the same question in connection with external pancreatic fistula. Another incidental observation of considerable importance was made concerning the danger of gangrene of the duodenum in case the mesentery is detached to any considerable extent.

In all of these experiments the duodenum was denuded of its mesentery, and consequently deprived of its direct vascular supply to the extent of from one to three inches, and yet in no case was the duodenum found gangrenous. As in other experiments upon the pancreas, the duodenum showed a marked immunity against gangrene from interruption of its vascular supply. The last experiment is of great importance, as it illustrates that digestion may remain unimpaired even if no pancreatic juice is produced, or in the event of its secretion not gaining entrance into the intestine on account of complete and permanent obliteration of the common or principal pancreatic ducts. The ligation experiments, as well as the internal pancreatic fistula, also corroborate the statement made by some authors, that the introduction into the circulation of normal pancreatic juice is innocuous, and that this abnormal supply is tolerated for two weeks or more without any appreciable ill consequences.

(To be continued.)

ELEPHANTIASIS ARABUM OF THE LABIA MAJORA.

A CASE OF SUCCESSFUL OPERATION BY EXCISION.

BY HENRY I. RAYMOND, A.M., M.D.,

ASSISTANT SURGEON UNITED STATES ARMY.

ELLEN, a full-blooded Indian, æt. twenty-eight, complexion that of a mulatto, hair black, physical condition good. She has lived all her life on the malarious banks of the Klamath, in California. It has been her habit since childhood to bathe and swim in the Klamath River, and her dietary has consisted largely of the fish caught in those waters. Unmarried, but became pregnant by a half-breed, and was delivered of a living child at full term three months ago. A venereal taint, although probable from the presence of two large condylomatous growths near the anus, is denied. A tumor of her genital lips, from the size of a walnut to that of a closed fist, has existed from birth. Though possibly congenital, the disease was not hereditary. The dimensions of the labial tumor at the time the patient conceived were about those of the double-clenched fists, but as the fœtus grew the pudendal swelling increased *pari passu*, so that at the termination of pregnancy the hypertrophic growth had attained nearly its present dimensions. Has occasional chills, and has had one since she came into the valley for surgical treatment. The cold stage lasts about half an hour, and then follow the hot and sweating stages. During the malarial paroxysms the tumor smarts and burns, and feels hot and tense, until relief comes in the sweating stage.

On December 4, 1885, I saw the patient for the first time and found a pendulous mass of solid but elastic consistency hanging from the pudendum, suspended by a strong pedicle, of horseshoe shape. The skin of the pedicle was slightly thickened, but not nodular; it was not adherent to the subjacent tissue, or abnormal in color. It was the natural skin of the abdomen drawn by virtue of its elasticity much below the pubic symphysis; the pubic growth of hair was seated upon the body of the tumor. The skin of the tumor proper was thickened and rugose and in places nodular, and adherent throughout to the parts beneath. It was markedly pigmented. No increased sensitiveness in the tumor. A deep sulcus (three inches) extended along its posterior aspect from the anterior commissure of the vulva downward. No particularly offensive odor came from the parts. The urine on being voided ran down the sulcus and caused more or less irritation and burning. The cumbersomeness of this *cutis pendula* greatly impeded locomotion; when this act was performed the growth was swung between the thighs posteriorly. Its attachments would not permit it to be carried upward over the abdomen. The largest circumference of the outgrowth was the horizontal, being thirty inches, the antero-posterior twenty-four inches, the latero-lateral twenty-two inches, shortest circumference of pedicle, eighteen inches.¹

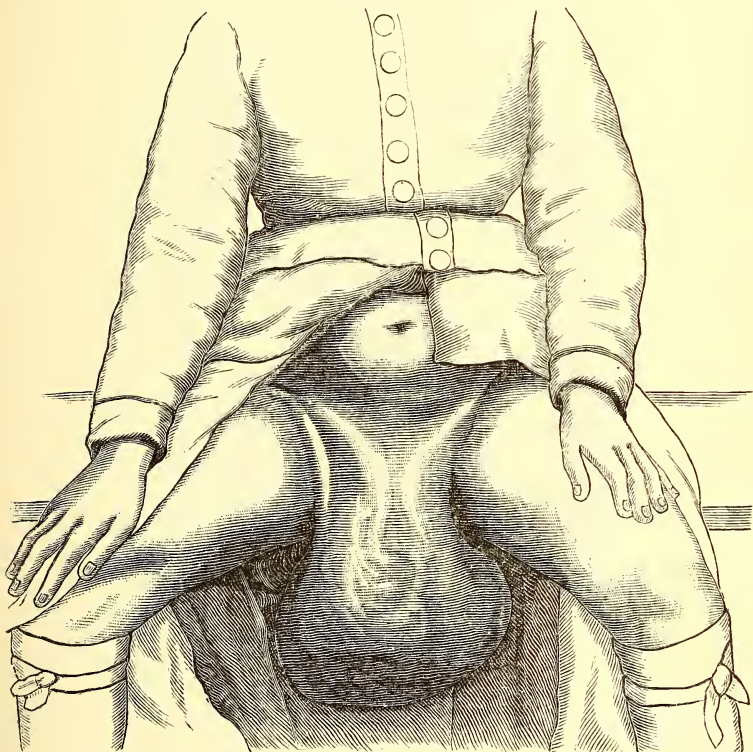
OPERATION.—On the 2d day of January, 1886, the patient was placed upon the operating table and the tumor compressed by an elastic bandage to drain it of its blood. To our astonishment the pedicle became more solid and largely increased in bulk, while the fundus yielded to the palpating fingers the sensation of elastic fluctuation. The bandage was removed at once and the growth allowed to hang pendent in the hope that it would revert to its original shape, as the increased bulk of the pedicle

¹ The growth was forwarded to the Surgeon-General, U. S. Army, for the National Medical Museum.

was objectionable. The shape the tumor assumed under compression found its explanation later in the histology of the morbid growth; this latter was made up largely of fat and cellular spaces filled with albuminous fluid. My only medical assistant was Dr. William Michel, physician to the Hoopa Valley Indian Reservation, other assistants being six non-commissioned officers of Co. G., 8th U. S. Infantry.

Every precaution was taken to guard against excessive hemorrhage and shock. Actual cautery irons were at hand to sear the tissues if need be, after staying the flow of blood by Esmarch's rubber tubing. I placed my chief reliance for the prevention of loss of blood, however,

FIG. 1.



Front view of tumor.

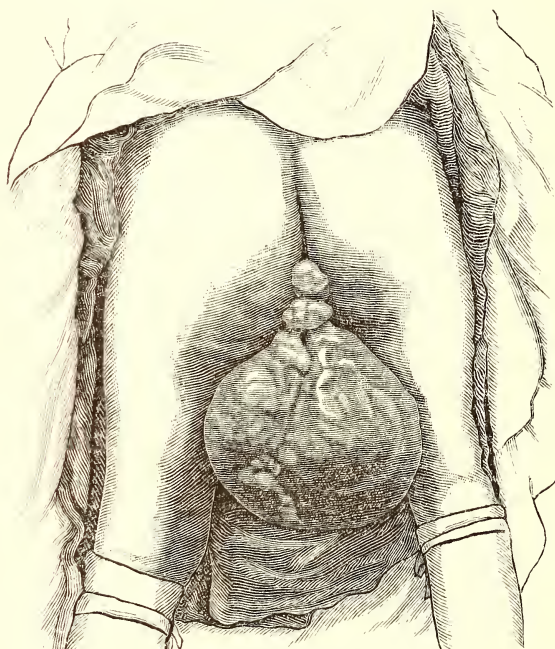
upon a cord tourniquet made by an Indian out of some peculiar fibre stronger than any white man's thread, and applied after the manner of Fayrer's whip-cord tourniquet, viz., with a ring slipped over a loop of the cord to keep the cords together when traction was made. The ends of the cord, attached to wooden handles, were intrusted to the care of two assistants. The device is the same as that used by stockmen in altering their cattle and stallions.

The patient having been put under ether, an incision through the skin nearly two feet in length was made around the pedicle from one labium to the other, sparing the sound skin, which was then reflected and the cord tourniquet adjusted. To prevent any possibility of its slipping or of allowing the pedicle to retract after excision, two long upholsterer's

needles were made to transfix the pedicle on a plane just anterior to the tourniquet and posterior to the contemplated excision. The tumor was removed by a few strokes of the knife. On loosening the tourniquet trifling hemorrhage followed, chiefly venous. This was arrested by hot water and compression, so that not a single ligature was applied.

The operation lasted thirty-five minutes. Sufficient sound skin was saved to cover with flaps nearly the entire raw surface of the amputation cut. Through drainage was instituted. Healing was accomplished in about two weeks, except over an area two inches square, which was left to cicatrize. The temperature ranged between 99° F. and 101° F.

FIG. 2.



Back view of tumor.

except on the fifth day when it touched 103° F., owing to defective drainage. On the seventh day the temperature fell to normal, and thereafter intermitted each morning, but did not vary much from the norm.

Several interesting features in the clinical history of Arabian elephantiasis are illustrated by the foregoing case: (1) The predilection of elephantoid disease for the dark races. (2) Its etiological relations to malaria and other climatic influences. (3) The unimportant *role* that heredity appears to play as a predisposing cause. (4) The impetus communicated to the growth of the morbid mass by the advent of pregnancy. (5) The foetus was carried to full term, and delivery was not impeded by the immensely hypertrophied labia, as the parturient canal and outlet were not compromised in their distensibility and calibre.

FORT GASTON, HOOPA VALLEY, CALIFORNIA.

REVIEWS.

RECENT BRAIN SURGERY.

1. TRANSACTIONS OF THE AMERICAN SURGICAL ASSOCIATION. Volume III. Edited by J. EWING MEARS, M.D. 8vo. pp. xxxv. 396. Philadelphia: P. Blakiston's Son & Co. London: Cassell & Co. Limited.
2. THE FIELD AND LIMITATION OF THE OPERATIVE SURGERY OF THE HUMAN BRAIN. By JOHN B. ROBERTS, A.M., M.D., Prof. of Anatomy and Surgery in Philadelphia Polyclinic. 8vo. pp. 80. Philadelphia: P. Blakiston's Son & Co., 1885.
3. CASE OF CEREBRAL TUMOR. By A. HUGHES BENNETT, M.D., F.R.C.P. The Surgical Treatment, by RICKMAN J. GODLEE, M.S., F.R.C.S. From Vol. LXVIII. of the *Medico-Chirurgical Transactions*. London, 8vo. pp. 33.

PENDING an examination of the larger volume above mentioned, we would direct attention to its opening paper, which stands second in our caption, and the account of an actual experience in brain surgery, which we have named last. We do this with the less hesitation, on account both of the importance of the subject and from the excellence of the work which Dr. Roberts has put into his paper. Excellent from its thoroughness and its orderly arrangement, even if we may be unwilling to follow him at all lengths in the revolutionary teachings into which his enthusiasm has led him.

It is not very long since when, under the reaction which followed the free use of the trepan by surgeons a century ago, there was a great indisposition to interfere with brain cases, and the expectant method, aided by more or less wisely conceived general treatment was the principal reliance of most conservative surgeons. Indeed, it is not many years since the trephine was a but little used instrument, and when, though its value was theoretically admitted, its application was very rare, and it was allowed to repose for long periods in the case which contained it. But again the pendulum swings, and this brochure of Dr. Roberts sets forth the widespread change which has come into the minds of many surgeons, while he lays down rules and principles of treatment which, if sustained by experience and general observation, will make the operation of trephining a most common one. As we have hinted, the enthusiasm of Dr. Roberts has led him very far, and some of his statements brought upon him much criticism at the Association when they were first promulgated; but new measures need enthusiastic support, and we believe the very positiveness of his expressions will lead many to make at least partial trial of the steps he recommends, and result in a modified adoption of some of his views.

The improved results obtained by antiseptic surgery, and the advances made in cerebral localization, have been factors which inevitably led to bolder and more extreme measures in dealing with brain injuries, from the comparatively greater safety attending operations, and the much greater accuracy attainable in locating the precise point of injury. How accurately the seat of disease may be localized is well shown by the pamphlet named last at the head of this review. This pamphlet tells of

a patient who suffered intensely from neuralgic pains, in addition to the distressing symptoms of advancing epilepsy, apparently dependent upon an old cranial injury from a falling tree. By an application of the principles of cerebral localization, the diagnosis was made that there was an encephalic growth of limited size at the middle part of the fissure of Rolando. The severity of the symptoms warranting interference, a trephine was three times applied, a triangular portion of the skull being thereby removed. After incising the dura mater, which presented nothing peculiar beyond somewhat excessive bulging, it was deemed wise to make an incision into the exposed cerebral convolution, and at a depth of from one-eighth to one-quarter of an inch a gliomatous tumor was exposed and successfully removed.

We say successfully, for the reason that the patient survived from November 25th to December 23d, though he succumbed to meningitis upon the latter date. This ultimately unfavorable issue Mr. Godlee is inclined to attribute to some defect in the antiseptic precautions. Whether this be so or not, the case well illustrates the very bold surgery that may justifiably be resorted to in a case that is otherwise hopeless. By a careful and minute study of the paralyses which were present, a very accurate diagnosis, both as to the size and location of the tumor, was arrived at; and although the ultimate issue was fatal, it must remain a problem whether more scrupulous care in the use of antiseptic methods might not have averted the inflammatory processes which caused death. Certain it is that this one case goes as far as one case can to prove that cerebral localization is an established fact of which the surgeon may avail himself in similar conditions. Published at about the time Dr. Roberts's paper was read, this interesting case does something to fortify and strengthen his position. It is worthy of especial note that Dr. Bennett and Mr. Godlee, in great measure, disregarded the local symptoms, such as a tender spot, relying chiefly upon the physiological ones, and that the tumor was not situated upon the side of the head originally injured.

But this case does not stand alone, and Dr. Roberts refers to several others in which the same steps were pursued; yet beyond two, as yet unpublished, by Macewen, of Glasgow, the records do not tell of a case in which life has been preserved by the proceeding, and the dictum of John Ashhurst, that the investigations of students of this subject "are more ingenious than practically useful," remains to be contradicted by more extended experience. This fact, however, should not lead to discouragement, as the subject is yet new, and we may still look for better results in the hands of daring and enthusiastic surgeons.

We have been led somewhat into a by-path by the details of this interesting case, and it is time that we directed attention to the many other and important teachings contained in this brochure of Dr. Roberts. In the first place, our author commits himself very fully to the opinion that the symptoms usually attributed to compression of the brain are in reality due to intracranial inflammation. That this is very often the truth will be admitted by most surgeons, yet there will be found some who will point to a few recorded cases in which the symptoms have appeared coincidently with the injury, and have been promptly relieved upon elevation of the depressed bone. For ourselves we are inclined, with most others, to attribute the speedy appearance of the symptoms to contusion or laceration of the brain substance, and we have not seen any cases like those classical ones in which there was instant return to consciousness as the bone was lifted.

The second article of Dr. Roberts's creed is that, owing to improved methods of treatment, risk to life is but little increased by making an incision which converts a simple fracture of the cranium into a compound one. The third article of belief is the famous one in which our author states his conviction that the proper removal of portions of the cranium causes little more risk to life than amputation through a metacarpal bone. In these two articles Dr. Roberts goes very far, and for the latter one he was subjected to a good deal of criticism by the members of the Surgical Association, and we think with justice. Enthusiasm is very well, indeed it is a most desirable quality, but there is no use in belittling the serious dangers attending an operation. We may decide to do an operation undeterred by its risks, but we will do wisely to approach it with our eyes open, and prepared to face its dangers. For ourselves, we should much prefer to undergo a metacarpal amputation to a trephining, and we should be very unwilling to have a long incision made in the scalp that the surgeon may have the satisfaction of knowing that there is no fracture, as was done with Dr. Roberts's approval in one case he cites. We have some confidence in antiseptic methods, but we should be sorry to convert a simple fissured fracture of the skull into a compound one, nevertheless. We might possibly forget some antiseptic precaution, and certainly the relations of the skull-cap, anatomically considered, are more important than those of any metacarpal bone. While we venture thus to differ with Dr. Roberts, we think with him that the dangers of trephining *per se* have been exaggerated, and the figures he gives do much to establish his position.

Dr. Roberts's fourth proposition is that in the majority of cranial fractures the inner table is more splintered than the outer one, and from this he goes on to argue in favor of early preventive trephining, believing that it is more frequently demanded for purposes of exploration than as a therapeutic measure. He may be right as to the relative frequency of splintering of the internal table, at least in those where there is any depression; but despite our author's conviction of the innocuousness of trephining, we cannot but look with doubt upon the formulation of a rule of practice unsupported by a large series of accurate observations establishing the pathological fact upon which it is based.

Going on to the sixth proposition of our author, we see no reason to oppose his view that drainage is urgently demanded in wounds penetrating the cranial cavity; nor, in the face of the very unfavorable statistics obtained in gunshot wounds by the expectant method, can any harm follow the adoption of his advice, always to trephine in every such injury. Yet we would certainly hesitate to do as Dr. Roberts says he did on one occasion—insert the little finger for its entire length into the cerebral wound in an attempt to touch the bullet. Neither do we see reason to differ from the propositions that the cerebral hemispheres may be incised with comparative impunity, and that wounds of meningeal arteries or cerebral sinuses should be treated on the same principles which guide us in controlling hemorrhage elsewhere.

The ninth proposition laid down by Dr. Roberts deals with the importance of surgeons familiarizing themselves with the results of the study of cerebral localization. To this subject an entire chapter is devoted—and it bears the marks of careful, conscientious study upon every page. It is abundantly supplied with diagrams, and has a valuable table, which sets forth in categorical fashion the state of our knowl-

edge upon this interesting subject, as understood at the time the essay was prepared. It is enough to say that whoever wishes to become acquainted with this matter cannot do better than study this admirable chapter. Dr. Roberts reminds his readers that much of the ground covered by this chapter is debatable, which is very true, but yet it is ground upon which more and more certain advances are made every day; and we do not doubt that while there may be many corrections to be made in our author's scheme, there remains much that is not likely to be removed by further research, though there will unquestionably be many additions made to it. We do not know that neurologists will admit that it is more important for surgeons to be acquainted with their work than they are themselves, as Dr. Roberts thinks, but we do think that it is a subject which no surgeon can afford to neglect.

Into the details of treatment which Dr. Roberts proposes we cannot go at length. It is sufficient to say that after enumerating the various injuries and ailments which may cause the propriety of trephining to be considered, the chief remedy is the trephine. There are very few conditions where the use of this instrument is not directed as possibly, probably, or certainly the appropriate remedy.

As we have before said, Dr. Roberts is enthusiastic in his advocacy of trephining, and he concludes this admirable essay with most sanguine anticipations of the future of that operation. He thinks that "in fractures, hemorrhage, and abscess, perforation of the skull will soon become quite common." While he is sure that in certain conditions, epilepsy, insanity, and tumor can only be successfully treated by operation, he recognizes the fact that the profession will be more slow to resort to such measures in cases of disease.

For ourselves, we do not doubt that our author's views will prevail more or less, their positiveness and apparent theoretical soundness will secure this; but after the test of experience has been applied, and the doctor has bored a large number of cranial holes, we question whether he retains all his enthusiasm, or remains satisfied as to the absolute correctness of all his attractive theories. This monograph, however, will exert an influence, and give an impetus to trephining, and the issue must be left to time.

The length at which we have discussed the subject presented by Dr. Roberts, will prevent our giving more than a cursory notice to the remainder of this large and handsome volume. But in adopting this course we hope it will not be thought that we lightly esteem the value of many of the articles passed over in silence. Three of them are experimental studies: one on *Surgical Bacteria*, by H. C. Ernst, of Boston; and one, the longest in the volume, on *Air Embolism*, by Senn, of Milwaukee; while a third, by J. C. Warren, of Boston, deals in an admirable way with that ever interesting and important subject, *The healing of arteries after ligation*.

An admirably instructive paper is one in which Professor S. W. Gross judiciously considers *Nephrectomy: its indications and contraindications*, on the basis of 233 cases he has collated. In a terse, clear article, headed *Nephrolithotomy*, Dr. L. McLane Tiffany tells of the now famous case in which he successfully removed from the kidney a phosphate of lime concretion weighing 556 grains, and discusses the merits and indications for the operation in the light shed upon it by our present experience. Although this case attracted much attention at the time it was reported,

its authoritative narration may be advantageously studied by any surgeon called upon to consider the propriety of resorting to the same operation.

Another very interesting narrative is the *Report of a case of cholecystotomy*, by Dr. C. T. Parkes, of Chicago, where the gall-bladder was twice opened in the same patient, and with complete ultimate success. After the first operation some small gall-stones were removed, but the obstruction of the common duct appeared rather to depend upon inspissated mucus.

Dr. John W. S. Gouley contributes *Some points in the surgery of the hypertrophied prostate*, in which he pays a high compliment to the labors of Mercier, of Paris. The paper abounds in practical suggestions, founded on the extensive experience of its author, and should be widely read. The same is true of a paper on *Phosphorus-necrosis of the jaws*, presented by Dr. Mears, who gives his exceptional experience with this most serious affection, and formulates the conclusions as to treatment that he has arrived at. This paper is abundantly illustrated, and it is to be hoped that the antidotal and preventive value of turpentine in counteracting the deleterious effects of phosphorous fumes will not be neglected.

The etiology of traumatic tetanus is considered by Dr. P. S. Connor, in an interesting and most suggestive paper, in which the question is raised whether the true explanation of the origin of this hitherto inexplicable phenomenon may not possibly be found in some microbe. In the discussion that follows, it was evident that the members of the Association had not any settled conviction which would be rudely dispelled by any new theory. The volume concludes with a *Device for atmospheric purification*, by Dr. Prince, of Illinois.

In thus so summarily going over the contents of this volume, we feel that we owe an apology to its contributors for such insufficient notices of the papers they have prepared; while we warn our readers that they must not judge of the value of those papers by the length at which we have been able to speak of them. Altogether this volume tells of a vigorous and active association, fairly representative of the surgical science of the country. Its members are to be congratulated upon the good work thus far accomplished, and which may justly be regarded as the harbinger of future achievements.

S. A.

RECENT WORKS ON DISEASES OF THE LARYNX AND RESPIRATORY PASSAGES.

1. THE THERAPEUTICS OF THE RESPIRATORY PASSAGES. By PROSSER JAMES, M.D., Lecturer on Materia Medica at the London Hospital Medical College, etc. Pp. 316. New York: Wm. Wood & Co., 1884.
 2. LARYNGOSCOPY AND RHINOSCOPY. Fourth edition, enlarged, with hand-colored plates. By PROSSER JAMES, M.D. Pp. 222. New York: Wm. Wood & Co., 1885.
 3. DISEASES OF THE LARYNX. By DR. J. GOTSTEIN, Lecturer at the University of Breslau. Translated and added to by P. McBRIDE, M.D., of Edinburgh. Pp. 270. Edinburgh and Lond.: W. & A. K. Johnston, 1885.
1. THIS excellent brochure is intended, as the author tells us in his preface, "mainly for those who have left the schools and entered upon

the responsibilities of practice," and we venture to add that there are few of the class to whom it is dedicated who will not derive some information and pleasure from the perusal of its pages.

The title is, to a certain extent, misleading. The author has called it "Therapeutics of the Respiratory Passages," but it embraces a much wider range, and must be regarded rather in the light of a systematic treatise on some of the more important articles of the *materia medica*. After a short introductory chapter, and one on nutrition in its relation to therapeutics, over forty pages are devoted to the discussion of the physiology of respiration, the preparation of food stuffs, the composition and physiological properties of the digestive juices and the consideration of aliments as remedies. Seventeen pages follow on "Iron" and "Phosphorus and its Compounds." The author very properly cautions against the injudicious use of phosphorus in phthisis—a warning which is particularly appropriate in view of the indiscriminate way in which it is at present administered in that disease. He furthermore considers the curative value of the hypophosphites insisted on by Churchill as exaggerated, nor has he seen much benefit from their employment in chronic bronchitis and emphysema, the cases most benefited being those of incipient phthisis, without fever and hæmoptysis, and chronic fibroid degeneration of the lung.

Separate chapters are devoted to the subjects of digestion, transfusion, beverages, exercise and rest, and alcohol, which also include brief paragraphs on injections into serous cavities and the hypodermatic injection of blood and other fluids. The important subject of rectal alimentation is dismissed in a very brief manner, while the incomplete section on coca and cocaine, or, as the author prefers to call them, "cuca" and "cucaïne," was probably written before the discovery of Koller.

Dr. James treats of remedies directed toward the cure of respiratory affections under the following classification:

(I.) *Denutrients*, including (1) antiphlogistics, (2) bleeding, (3) counter-irritation, (4) evacuants, (5) mercury, (6) diaphoretics.

(II.) *Antipyretics*, including (1) cold, (2) quinia, (3) salicin, (4) kairin, (5) veratria, (6) digitalis, (7) aconite, etc.

(III.) *Neurotics* (narcotics).

(IV.) *Pneumatics*, including (1) expectorants, (2) antiseptics and disinfectants, (3) anodynes and sedatives, (4) contra-expectorants, (5) central pneumatics.

(V.) *Topical Pneumatics* (inhalations and other topical applications).

It would be impossible to criticise, within the limits of this review, the author's comments on the individual members of this classification. Suffice it to say, that whatever may be said of the latter, Dr. James has given us an interesting and instructive account of the principal effects and uses of these remedies, which is still further enriched by many matters of historical value, and which is in agreeable contrast to the arid narrative of many works on therapeutics. The section on topical pneumatics is incomplete and disappointing, and we are amazed at the author's apparent ignorance of the improved methods of topical medication of the upper air-passages in common use among American specialists. The subject of medicated sprays is dismissed with the merest reference, while considerable space is given to the more antiquated methods of gargling and the nasal douche. Regurgitation of fluids through the nose is spoken of as a "natural nasal douche", from which we can often

obtain most satisfactory results, but we are rather inclined to regard this method as an unphysiological procedure and a circuitous way of accomplishing a great deal of possible harm with considerable difficulty and personal inconvenience, and the same may be said of the laryngeal gargle of Monsieur Guinier. It is true that gargles are occasionally of benefit, but the sphere of their usefulness is contracted. Even by the so-called method of Troeltsch, very little of the fluid reaches the deeper portions of the throat, and as all communication between the upper and lower pharynx is cut off during the act, the remedy does not reach the spot it is designed to medicate. The contraction of the palato-pharyngeal muscles may, however, be of service in the mechanical dislodgement of mucus from the nasopharyngeal space. We have found it useful also to direct the patient to assume the recumbent posture with the head thrown slightly back, and allow the fluid to gravitate into the pharynx. In strongly recommending alum as a gargle, the author should, we think, have cautioned against the injurious effects of this agent on the teeth.

We regard the nasal douche as a remedy of questionable utility, even when used with the precautions insisted upon by the advocates of its use, whilst its indiscriminate use, as indulged in by many even at the present day, cannot be too severely condemned. It by no means accomplishes what is claimed for it; but, on the other hand, subjects the patient to many possible and unnecessary dangers. Besides the acute inflammation and abscess of the middle ear so often caused by its employment, it tends to aggravate the nasal trouble, and we have known chronic inflammation of the tympanic cavity to follow the prolonged use of this remedy. We have also known the severest form of acute otitis media follow the use of the post-nasal syringe, so often employed by the general practitioner, and even by specialists.

Dr. James is an easy writer and a man of scholarly tastes, and his book is written in an agreeable style, which at times is rather prolix and pedantic, but which enlists the interest of the reader to the end. Unlike many other therapeutists, he does not laud the infallibility of drugs, the applications of which are things based upon strictly experimental inquiries, but is disposed to regard them in the light of clinical experience and practical results. Although the careless way in which a great part of the reference work has been done, and, indeed, the quotation on page after page of authors without giving any references at all, may awaken in the minds of those who are not acquainted with the author grave suspicion of borrowed erudition, still the work represents a great deal of painstaking literary labor, and, taken as a whole, we can confidently recommend it both to the special worker and general practitioner as a valuable contribution to the literature of respiratory therapeutics.

2. This is practically the fourth edition, with additions, of the author's little primer on "Sore Throat," but invested with a more appropriate title. Within the bounds of such a small volume, it would be impossible to treat in a satisfactory manner, even for a beginner, the subject of rhinology and laryngology, and we think, therefore, the present title more exactly definitive of its legitimate scope.

In calling attention to the general excellence of this little manual, the third edition of which has already been reviewed in this journal, we feel it our duty at the same time to point out some of its more noticeable

defects. In the first place, we think the author too frequently creates an injurious impression, by arrogating to himself credit of priority and invention in matters of infinitesimally small importance, and which every student will discover in the alphabet of his special studies. His implied claims, too, in the matter of the tongue depressor known as "Türk's," and the nasal speculum of Fränkel, are unfortunately unsupported by any of the published evidence which historical accuracy demands as the test of priority in discovery.

There are other matters which we think are calculated to bewilder the student. In attempting, for example, to elucidate the theory of laryngoscopy on page 54 by the inverted word "glottis," we can scarcely conceive of a more certain way of producing in the student's mind the very opposite of a lucid illustration. We would also caution the tyro against mistaking the figure on page 90 for the normal appearance of the posterior nares, as seen in the rhinoscopic mirror. As an attempt to portray a well-marked case of hypertrophic catarrhal rhinitis, producing almost complete occlusion of the nares, the diagram would have been a marked success; but between the condition there depicted and the normal appearance of the parts, there is not the slightest shadow of a resemblance.

It is a disagreeable task to criticise the artistic tastes of our author, but we would also strongly advise the student not to examine the colored plates at the end of the volume until he has thoroughly familiarized himself with the laryngoscopic conditions which they represent in the living subject. We say this in no captious spirit, but because we regard it as a point of the gravest importance. First impressions of pathological conditions derived from diagrams and other forms of pictorial illustration, are often very difficult to eradicate, and the colored plates of this manual are more calculated to give erroneous impression than to instruct.

Occasionally a loose statement is encountered, such as that found on page 91, that in the normal posterior rhinoscopic image "the septum nasi seldom occupies the exact centre of the image, but leans a little to one side or other, so that we rarely see a rhinoscopic image precisely symmetrical." As a matter of fact, deflection of the posterior third of the vomer is one of the rarest of curiosities, the position of its posterior border being almost invariably median and perpendicular—and we can recall only two recorded cases of deflection in this situation—one reported by Prof. Wenzel Gruber, of St. Petersburg, and one by the writer of this review.

We have always wondered why the orifice of the Eustachian tube, as seen with the rhinoscope, should be universally described as "trumpet-shaped," and have thought that its comparison to an enlarged cervix uteri comes nearer the conception of its actual appearance.

Several instruments are figured and their uses dilated upon, which the student will probably never use. We had thought, for example, that the laryngeal syringe had long since been relegated to the limbo of museum curiosities, but the author figures three different varieties and devotes considerable space to their use. Few, we believe, would resort to the method at the present day, who had in their possession the simplest form of spray apparatus, or who could command the services of a probe and a piece of absorbent cotton. Nor do we think that the re-

moval of the uvula by means of the ancient "sickle" would be chosen in preference to its ablation by a pair of ordinary uvula scissors.

The space devoted to rhinoscopy and its difficulties, is hardly commensurate, we think, with the importance of this method of diagnosis, while little or nothing is said concerning the morbid conditions which the use of this procedure reveals.

Notwithstanding its defects, the book is one of merit and contains much valuable information for the beginner.

3. While the necessity for the translation of Dr. Gottstein's monograph is not as obvious as is implied in the preface of the translator, we can, nevertheless, recommend it to those unacquainted with German as an excellent and faithful presentation of the commoner affections of the larynx.

The first sixty-one pages include chapters on the anatomy and physiology of the larynx, general etiology, diagnosis, symptoms, and treatment. Laryngeal affections are divided into primary (diseases of the mucous membrane, perichondrium and cartilage, wounds and injuries, adhesions and cicatricial contractions, neoplasms, lupus, leprosy, foreign bodies, neuroses) and secondary (tuberculosis, syphilis, measles, scarlatina, smallpox, typhoid and typhus fever, erysipelas and whooping-cough)—a classification which is not strictly accurate and logical, for, as the translator correctly points out, neither laryngeal lupus nor lepra is a primary affection, and we may add that, as disease of the mucous membrane, cartilage and perichondrium, neoplasms and neuroses may be either primary or secondary, and to a large extent the latter is the case, the separation of laryngeal diseases proposed by the author is both artificial and calculated to mislead.

The subject of etiology is briefly dismissed in the usual stereotyped manner common to all works on laryngeal disease. If the translation be a literal one, the nasal cavity, "intended to warm and purify the inspired air," is spoken of as imperfectly fulfilling this function, and the inference is drawn that atmospheric changes influence the mucous membrane of the larynx directly through this imperfect but natural discharge of function. We cannot support the insinuation that laryngeal disease may be due to a naturally imperfect discharge of function on the part of the nasal cavities. The dependence of affections of the windpipe upon perverted nasal function is quite another thing, and we become every day more impressed with the conviction that the great secret in the treatment of laryngeal disease resides in the recognition of the fact, that the vast majority of cases of catarrhal laryngitis are secondary to or sequels of a diseased condition of the nasal passages.

In the matter of therapeutics, the author recommends measures which for the most part are severer than those used in this country. His preference for the sponge and brush for topical applications over the medicated spray, which latter he finds unsatisfactory, will not be shared by his colleagues on this side of the Atlantic.

Of the excellent chapters in Part II, that on "Neuroses" is the most interesting to the specialist, although the author fails to discuss many of the moot points in the pathology of this class of laryngeal affections.

Part III. opens with the discussion of laryngeal tuberculosis—a subject of surpassing interest both to the specialist and general practitioner—and considerable space (twenty-six pages) is very properly given to

this affection. The question of primary invasion of the larynx in tuberculosis is left *sub judice*, although such a view "derives some support from recent researches on the parasitic nature of tuberculosis." Although the laryngoscope has apparently thrown much light upon the problem, the primary occurrence of tubercle in the larynx can only be definitely determined by post-mortem evidence, and in this connection we would call attention to the recent claim of Orth, that he has found tubercle in the larynx unconnected with disease of the pulmonary tissue.

Dr. Gottstein very correctly considers that pressure on the recurrent nerve by the infiltrated lung tissue is insufficient to account for the paresis and paralysis of the laryngeal muscles in the first and second stages of phthisis, preferring, with the majority of writers, to ascribe them to defective innervation, the accompanying catarrh, or to the granular changes in the muscles described by E. Franckel. That in some cases they may be due to the deposit of miliary tubercles in the muscle fibres, and between the fibrillæ, is also probable from the changes in the laryngeal muscles described by Heinze,¹ and the writer of this review.²

Very little space is given to the discussion of the much controverted question of the aphthous, or, as we would prefer to call them, diphtheritic ulcerations, so often met with in the windpipe, and more particularly the trachea, in the later stages of pulmonary tuberculosis. We have given at length elsewhere³ our reasons for regarding this form of ulceration as distinct on the one hand from catarrhal, and on the other from the characteristic tubercular ulcer found in the larynx and trachea. Even in the light of the new gospel of tuberculosis, we consider it by no means proven that true tubercular infiltration and ulceration of the windpipe are due either to the direct action of bacilli from without or to the presence of these parasites in the sputa. The tubercular process, as shown by Heinze, commences under the epithelium, whereas in the ulcers we are reviewing, that structure is always first affected. We regard it, then, as extremely probable that diphtheritic, as contradistinguished from tubercular, ulceration of the windpipe in pulmonary phthisis is due to an inoculation, so to speak, of the mucous membrane with the detritus of the broken-down pulmonary tissues, leading to a loss of substance pathologically distinct from the ulcer commonly known as "tubercular," but possessing some of its external appearances—a view which seems to us to reconcile the widely divergent opinions upon this subject and which reduces the influence of the sputa in the production of laryngeal and tracheal ulceration to more definite and appreciable dimensions. Notwithstanding, however, the fact that diphtheritic ulceration owes its existence to the pulmonary disintegration, and is therefore intimately related to the tubercular process; notwithstanding the possible future discovery of the constant presence of bacilli in these ulcers, it would be unsafe to regard them as specific tubercular products, until the whole pathological anatomy of tubercle be changed, so that the essential pathognomonic histological evidence of tuberculosis be drawn not from a well-defined characteristic structural lesion, but from any tissue change that contains a bacillus.

¹ Die Kehlkopfschwindsacht, Leipzig, 1876.

² Archives of Medicine, New York, Oct. 1882.

³ Monatsschrift für Ohrenheilkunde, etc., Berlin, No. 9, 1881, and Trans. Medico-Chir. Faculty of Maryland, 1882.

We find no reference in this excellent chapter to that interesting form of laryngeal tuberculosis in which solitary tubercular tumors are met with composed of an aggregation of miliary tubercles unassociated with infiltration and ulceration of the surrounding mucous membrane, which was first described in 1882,¹ and of which other examples have been since recorded.

In regard to the frequency of laryngeal disease in syphilis, the author regards the statistics of Lewin, who found the larynx affected 575 times in 20,000 patients, as the most reliable. This question is one which has always given rise to much dispute, and about which statistics differ very widely. While we do not propose in this review to enter into a critical examination of the sources of error discoverable in the antagonistic reports of different observers, it may be said, in general, that reconciliation of diverging opinions upon this subject can only be accomplished by taking the life-histories of the cases upon which the statistical evidence is based. Were this matter universally adopted, we believe that few syphilitics would be found who had not, at some period or other of the disease, suffered from some form of laryngeal affection. While it is probable, therefore, that the majority of cases, if untreated or neglected, will sooner or later develop some phase of laryngeal disorder, it is equally certain that the eruption of the disease in the larynx can be prevented or modified by early therapeutic interference. As the virulence of syphilitic lesions in general is modified by the employment of the more advanced and rational methods for its cure, so the destructive affections of the larynx are less frequently met with now, than in the time when the therapeutics of the disease were less perfectly understood, and when the exhibition of mercury to salivation was the catholicon of the profession.

We must take exception to the statement of the author in regard to the rarity of laryngeal syphilis in childhood. Some time ago we took the trouble to investigate this matter, and were surprised to find how frequently laryngeal disease is met with in the congenital form of syphilis. So far from being an uncommon occurrence to find the larynx involved, we soon came to regard such an event as one of the most constant pathological phenomena of congenital syphilis, to be looked for with the same confidence as in the acquired form of the disease.²

Short sections on the larynx in scarlet fever, typhus, etc., with an appendix in which the translator gives a *résumé* of recent observations on the innervation of the larynx, and adds an interesting case of so-called "chorea laryngis" which he believes lends support to the glottic spasm theory of this condition, complete the volume.

Although as an essay on laryngeal affections it is in some respects incomplete, the brochure of Dr. Gottstein is one of more than ordinary merit. His descriptions are clearly written, and accurate, and his comments on moot points as a rule eminently judicious. Many omissions occur, it is true, and many authors are not referred to whose names deserve mention in every work on diseases of the larynx, but these faults doubtless arise from the author's apparent unfamiliarity with foreign literature and to the contracted sphere of his literary researches.

In the English edition several typographical errors occur, and mistakes

¹ Archives of Medicine, N. Y., Oct. 1882.

² For a full account of the throat affections of congenital syphilis, see the October number of this journal for 1880.

in the spelling of proper names. Thus, for example Tuerck figures throughout the volume as "Tuerk," and Oliver as "Ollivier." Apart from this, the general get up of the work is excellent, and reflects credit on the English publisher.

The task of the translator is, as a rule, a laborious and thankless one, and we take, therefore, great pleasure in congratulating Dr. McBride upon the entirely satisfactory manner in which he has converted the German original into pure and readable English. J. N. M.

A HANDBOOK ON THE DISEASES OF THE NERVOUS SYSTEM. By JAMES ROSS, M.D., F.R.C.P., LL.D., Senior Assistant Physician to the Manchester Royal Infirmary, etc. 8vo. pp. 726. With 184 illustrations. Philadelphia: Lea Brothers & Co. London: J. & A. Churchill, 1885.

IF this volume had been entitled "A Handbook of the Anatomy, Physiology, and General Symptomatology of the Nervous System," we should find in it less to criticise and more to commend. But as it is called a "Handbook of the Diseases of the Nervous System," and as the author boldly says in his preface that it "is intended for the use of students, and such of my professional brethren as are so fully occupied in practice that little time is left to them for reading lengthy treatises and monographs on special subjects," both the arrangement and matter of the book call for decided criticism. It is with sincere regret that we say this, for it would be much more pleasant to praise highly the result of so much labor, so much study, and so much research.

Although no mention of the larger work is made in the preface, this volume is an abridgment of a treatise on *The Diseases of the Nervous System*, in two volumes, published in 1882, and reviewed at some length in the July number of this journal for that year. In this review some pains were taken to put side by side quotations from the works of Erb and Nothnagel, in Ziemssen's *Cyclopædia*, and the text of Dr. Ross's book which indicated that "several volumes of Ziemssen's *Cyclopædia* have been made use of with a freedom which only a liberal application of quotation marks could warrant," and that Dr. Ross "has not only plagiarized references, but has transcribed sentences and paragraphs without acknowledgment." Hence, our present task will lie in a different direction, and after making a hasty reference to the first part of the volume, which, as Dr. Ross says, is devoted to "General Neurology," and which occupies one-third of the book, we shall confine ourselves to the second part, or "Special Pathology of the Nervous System."

The first part of the book is a perfect treasury of knowledge collected from all possible sources. Apart from the unnecessary complication of symptoms and the compound names, which tend to make a difficult subject more difficult, this portion of the book is probably the best *résumé* of the general physiology and symptomatology of the nervous system that has yet been issued. It has been written with great care, the plates are very good, and particularly those showing the interdependence of the cerebro-spinal system, or, as Dr. Ross puts it, the encephalo-spino-neural system. The first part of the book alone makes

it valuable in any library because the information it contains could only be obtained with endless trouble from many authors.

The anatomical and physiological introduction and the consideration of the general morbid anatomy and physiology of the nervous system form a very good and clear exposition of what is now known on this subject. When, however, Dr. Ross reaches the 125th page and commences the consideration of the general symptomatology of the nervous system, he adopts a wordy nomenclature which is always to be avoided. Hyperpselaphisia, apselapsia, and allochiria, etc., could have been very well omitted in a work where space was valuable.

The first part concludes with a chapter on "General Treatment," which includes hydropathy, rest cure, Swedish movement cures, the mechanical vibrations of Dr. Mortimer Granville, and electricity in thirteen pages, leaving only two pages to internal remedies.

In the second part of Dr. Ross's book we find a faulty and laborious classification, a minute division of minor subjects, and a most superficial treatment of some of the most important troubles that daily come under the care of every neurologist. And we may add with great truth that Dr. Ross has neglected to give a place in his "Clinical Classification" to some most interesting and important diseases of the nervous system. There is no mention whatever of melancholia or insanity of any kind, or of Basedow's diseases, or hydrophobia.

The study of medicine has for its aim not only the acquisition of knowledge concerning disease, but also the attainment of skill and ability to cure the many ailments which afflict mankind. This is by far the most important and, in fact, the sole origin of medicine as a profession. If cure is impossible, then, at least, it is the duty of the physician in his school and in his books to teach the alleviation of suffering to the fullest extent.

The elaboration of medical treatises on various special subjects has been of late years the ambition of many authors, and the result is that the press is teeming with such books. Dr. Ross is an example of this tendency, and without anything new to say, no clinical knowledge to impart, and with an unparalleled neglect of the just and proper use of quotation marks, he has compiled from many authors a treatise in which diseases of the nervous system are divided and subdivided in a most complicated classification. The result of this effort is that many unimportant and useless subdivisions occupy the space which should have been devoted to acute and prevalent diseases. In fact, where there is no clinical necessity he has elaborated, and where there exists great clinical want he is silent or superficial.

In a "Handbook of the Diseases of the Nervous System" we should expect to find at least some well-organized treatment for the most curable and common troubles that we are daily called upon to treat. But the busy practitioner wishing, for example, to see what Dr. Ross recommends for trigeminal neuralgia, would find the treatment thereof nearly fifty pages removed from the description of the disease, and when he does at length find it in a most unlooked for and unlikely position, his reward is small and unprofitable. The treatment of megrim is even less satisfactory. The consideration of this important neurosis is included in a chapter with spinal irritation, neurasthenia, and headache, and is dismissed with a very cursory description. Guarana (*Paullina sorbilis*), which has quite a reputation among many neurologists as a remedy for

megrim, is called "Guarma powder," and is merely mentioned. To show the importance of this subject in a clinical point of view, we may say that the treatment of megrim in Liveing's book on this malady fills fifty-four pages, and that even an epitome of this most valuable chapter would add much to any work on nervous diseases.

In the section on "Neurasthenia" in the same chapter, Dr. Ross has made very apparent use of the writings of the late Dr. Beard without ever once alluding to his name. This author was fond of word-making and compounded from the Greek many strange-sounding names to explain the various phases of that apprehension, or torment from within, which is a prominent symptom of mild forms of melancholia or hypochondriasis. Dr. Ross has, however, missed the highest creation of that lamented medical philologist, who, after exhausting every other fear, or the fear of everything else, put a climax to his long list of symptoms by coining the word phobophobia, or fear of fears.

Chapter III. commences the consideration of "Spasmodic Disorders," which are divided into spino-neural spasms and cerebro-spinal spasms. By what system of reasoning, clinical or anatomical, Dr. Ross can include "spasms of the muscles of the eyeball" or "spasms in the area of distribution of the facial nerve" in the classification of spino-neural spasm we do not comprehend. After giving a long list of rare and unimportant muscular spasms, Dr. Ross comes to the consideration of writer's cramp and other occupation pareses (or, according to the text of this volume, professional hyperkineses), to which important and complex subject he devotes two pages, saying among other things, "Telegraphist's cramp has been met in France with the use of Morse's machine," inferring that this disorder exists among that unfortunate nation alone. The experience of every one will refute this singular idea of the French monopoly of telegrapher's spasm, for cases of this trouble are seen daily in every large city in this country.

Tetanus is tersely considered in the chapter on "Spino-neural Spasms," but there is space enough for the description of such conditions as "emprosthotonos," "orthotonos," and "pleurosthotonos." The treatment of this important disease is given in the next chapter on "Cerebro-spinal Spasms," and is concluded in a few lines. Cerebro-spinal spasms are thus divided, "I. Spasms from organic disease of cortex of the brain: (1) Crural monospasm or protospasm; (2) Brachial monospasm or protospasm; (3) Facial monospasm or protospasm; (4) Oculomotor monospasm or protospasm; (5) Masticatory monospasm or protospasm." Then follows "II. Spasmodic affections from functional disease of cortex of the brain. *a.* Epilepsy, *b.* Eclampsia, *c.* Hysterical spasmodic affections," etc.

As epilepsy is frequently caused by injuries to the brain and is often connected with serious organic disease of that organ, we do not see the reason for placing it first among those diseases which arise "from functional disease of the cortex of the brain." The study of hysteria is a very simple matter occupying little over one page. Referring to hysteria in boys, Dr. Ross says, among other things, "The depraved form of hysteria named *chorea major* is often met with in boys. In this variety of the disease the patients run, dance, jump, or climb with much greater readiness or dexterity than similar actions can be performed in health, or they may sing or recite poetry, even in a foreign language." We

hope this sentence may be generally understood by Dr. Ross's readers, but we candidly confess our inability to comprehend it.

When, however, Dr. Ross comes to consider chorea major, he does not consider it at all. In fact, grouping "Chorea" in the same chapter with "Paralysis Agitans and Multiple Sclerosis of the Brain and Spinal Cord," he gives this very important disease less consideration than either of the others. He says, "Heredity plays an important part in the production of chorea, but the transmission is probably always indirect." But in this study of chorea he omits many important considerations, and we need hardly enumerate these omissions when we say that the treatment is condensed in twenty lines. In referring to Rosenthal, we find he devotes thirteen pages of his treatise to this disease, and Radcliffe, in Reynolds's *System of Medicine*, gives an excellent account of the same subject in thirty-eight pages. We are somewhat surprised to find so prevalent and so interesting a disease dismissed in such a cursory manner, for this malady is increasing in frequency and severity.

It has been aptly said of the critic "that the temptation to exhibit his own cleverness at the author's expense is irresistible." This is a danger which an author runs when he writes a good book, but when his work does not reach the promises of his title-page, when it fails to give information on topics which most need elucidation, when its arrangement is bad and complicated, when it is burdened with turgid and useless names which tend to obscure rather than to simplify, we can find no reason to recommend such a work to those who need information concerning the diseases of the nervous system. Truly a most uncomfortable "handbook" when you have to search for certain diseases in the most unlikely places, and where the treatment of these maladies is as hard to find as a quotation from an obscure poet.

J. V. B.

THE MANAGEMENT OF LABOR AND OF THE LYING-IN PERIOD. A GUIDE FOR THE YOUNG PRACTITIONER. By HENRY G. LANDIS, A.M., M.D., Professor of Obstetrics and Diseases of Women in Starling Medical College, etc. 12mo. pp. 334. Philadelphia: Lea Brothers & Co., 1885. London: N. Griffin & Son.

THE object of this book is set forth on the title-page and in the preface; it is intended to be a guide to practice for the young practitioner, and not to deal with the needs of the student. We are compelled, in the interests of truth, to say that, while the exclusion of the student is advisable, we fail to see how a work so imperfect and so inaccurate can help the young practitioner. To illustrate our point, we will make a few quotations from the first chapter. On page 11 we are told that "Very little pain attends the contractions, unless disease of some sort has interfered with the proper action of the parts concerned. There should be no pain at all during the first stage." The first of these statements is absolutely untrue; the second, if a statement of fact, is also untrue, but it may be only a remonstrance with Providence. On page 15 we are told that, "If a woman has a markedly painful labor, it is because personal or inherited violation of hygienic law has caused her

to be afflicted with inflammatory or mechanical disabilities in the organs of parturition, and not because it is natural for women to suffer in childbirth." We should like to know what evidence can be produced for such a statement. On page 17, six hours is fixed as the "maximum limit of normal labor," a statement which, if it has any effect at all, can only tend to produce "meddlesome interfering" on the part of the "young practitioner."

On page 18, the second stage is said to last "from ten minutes to an hour;" lower down, "it is painful to admit that, notwithstanding the teachings and practice of the best obstetricians, and the near approach of obstetrics to a science, there is a widespread tendency to non-interference." This statement, again, is at variance with facts; the "best obstetricians" are the least meddlesome, and the whole history of modern midwifery has been in this direction. On page 19, the author goes so far as to speak of the "strong delusion that nature is all-sufficient, and that meddlesome interfering is bad." This is positively dangerous.

On the same page we read that "corsets, high heels, failure to take exercise in the open air, abuse of the sexual organs, have brought it to pass that a woman is rarely in labor without some complication which may or may not be removed by obstetrical treatment." Most of this is simply empty talk.

This takes us to page 21, the end of the first chapter. We cannot afford space to quote as freely from the remainder of the 329 pages, and can only pick out pieces here and there. On page 47 we read: "When once the head begins to press upon and stretch the perineum, the tenacity of the perineum is directly impaired by every degree of continuance of the labor. The longer the time taken to distend it, the more its circulation is impeded and its powers of cohesion diminished." This seems to us untrue, in the face of the well-established fact that gradual dilatation of the perineum is its greatest safeguard. Here, again, is a direct incentive to bad practice.

On page 94 we read that, after measuring the external conjugate, "we then guess how thick the sacrum and dorsal tissues are, and how thick the symphysis must be, and, deducting these measurements, we can guess how long the conjugate diameter is, which might have been done without so much trouble in measuring." This is an inaccurate and unfair statement; the author gives no indication how much is to be deducted. About his pelvimetry we shall have something to say presently.

On the same page, a few lines lower down, he says: "When" (in measuring the diagonal conjugate) "we succeed in touching the promontory, we note exactly where the anterior vulvar commissure [!] touches the skin of the hand. From this point to the finger-tip we measure, and this will give us the diagonal conjugate (Fig. 8). Since the inner [!] face of the symphysis is perpendicular [which it is not], we have the hypotenuse of a right-angled triangle," etc.

We cannot help saying that such statements as those just quoted would be sufficient to cause the rejection of a candidate in any good examination. We may dismiss the subject of pelvimetry and pelvic deformities by saying that the author never loses a chance of trying to throw ridicule on accuracy, and that he displays most imperfect knowledge of the subject—an instance of *unfamiliarity* breeding contempt.

The chapter on hemorrhage before the birth of the child is meagre

and unsatisfactory, and bears no trace of the work lately done on the subject. In the chapter on hemorrhage after delivery we read, page 105, that hot milk is the best drink, because "it is a near approach to blood;" why not then drink hot blood and get the actual thing? Hot milk is no doubt a good stimulant, but does milk or does blood taken by the mouth enter the circulation as milk or blood? On the same page the author says: "So certain is our control in these matters, that a death from post-partum hemorrhage, occurring under the supervision of a physician, must compel him to remorseful thoughts." This statement is of the same nature as the popular one that no woman dies in her confinement unless by some one's fault, and it is as accurate. On page 167 we read: "The hypodermic injection of whiskey and ether has already proved of value, and it is possible that enough fluid can be thus injected," etc. This would seem to imply that the whiskey is expected to fill the circulation to the amount of the blood lost. On the same page, whiskey is said "to find its way into the lacteal secretion with celerity," which is untrue. Six small pages are devoted to the subject of rupture of the uterus.

The chapter on septicæmia is incorrect and inadequate; the author does not appear to have assimilated any of the results of recent, or even comparatively ancient research. Take such a sentence as the following (page 303): "The real practical question is, whether external agencies may bring about the septic change when it would not otherwise originate. Can we carry any material poison, whether plain dirt or germs, which will convert an otherwise natural case into one of disease?" Such a frame of mind may be one of repose for its possessor, but it is fraught with extreme danger to patients.

We have spoken plainly, because teaching such as that contained in this book is, to our thinking, highly dangerous. We have only gathered specimens, but these could be multiplied at pleasure. Such a production as that before us is not creditable to a country which is doing good and serious work in midwifery, and which has produced so excellent a work on the subject as that by Lusk. We conclude our irksome task by recommending to our author the study of his countryman's book.

THE SURGICAL DISEASES OF CHILDREN. By EDMUND OWEN, M.B., F.R.C.S., Surgeon to the Hospital for Sick Children, Great Ormond Street, London. 12mo. pp. 585, with four chromo-lithographic plates and eighty-five engravings. London: Cassell & Co. Philadelphia: Lea Brothers & Co., 1886.

A VERY handy and convenient little volume, showing much painstaking care upon the part of its author, as well as practical acquaintance with his subject. From the fact that it forms one in a series of clinical manuals, Mr. Owen has had to compress his subject within somewhat narrow limits, and, as a consequence, some interesting matters are treated with much brevity. The affections thus summarily dismissed are quite naturally those which are comparatively rare—yet they are the very ones that will prove most puzzling to the general practitioner, and for information concerning which he will very surely turn to a work on

children's diseases, when confronted by something with which he is not familiar. This difficulty must always be met with when the attempt is made to include a large topic in a small book, and the criticism implied in our words is applicable to the plan of the work rather than to the way in which Mr. Owen has discharged his task.

The book is a thoroughly trustworthy manual of the surgery of children, based upon extended personal observation as well as careful study of surgical writers who have dealt with the same subject. We think there is a disposition on Mr. Owen's part to attach somewhat undue importance to some fleeting journal articles, and to put them upon a par with the teachings of those who have made for themselves reputations which entitle them to be regarded as authorities. Then Mr. Owen sometimes contents himself with citing authorities by name and giving his readers the benefit of their often conflicting views, without a positive expression of his own opinion. This is very trying to many persons likely to consult such a volume. They do not look for encyclopædic fulness of statement, and generally would prefer the simple dogmatic dictum of the author himself, and they are the more likely to do so in this case, because when Mr. Owen does speak for himself it is with a directness and soundness which leave nothing to be desired.

But we have taken up sufficient space with preliminary observations, and hasten to notice some points which have especially attracted our attention. The first of these is tracheotomy for croup, which follows a very good chapter upon diphtheria. The steps of the operation are clearly described, and many practical hints are given, which will be appreciated by any one who has experienced the anxiety incident to the performance of the operation with insufficient assistance. That the operation is one which most surgeons regard with anxiety, is pretty well recognized. But we sometimes question whether the mass of literature dealing with tracheotomy is not in part responsible for the apprehension with which it is regarded. Not that we would for a moment be understood as belittling a proceeding which may well try the soul of any surgeon. But, after all, it is a proceeding for which there are very definite rules, which if carefully followed, *without haste* and with careful *determination*, will lead to a successful result, at least for the time. It is the sad, ultimate issue which attends so large a number of cases, that makes many hesitate to resort to it. If obliged to act hastily, and minutes are often of vast importance, the risk of hemorrhage is one which is deservedly dreaded. Yet if the surgeon keeps in the middle line, here, if ever, the safe one, and eschews the use of cutting implements while making the deeper dissection, he will in most cases get down safely to the trachea. Mr. Owen recommends a bivalved tube as easy to introduce even when the tracheal wound is small. The same end can be attained by a guide with a conical end, which can be withdrawn so soon as the tube is fairly introduced. Mr. Owen advocates the use of chloroform in all cases. In this he differs from many surgeons, whose experience leads them to look with doubt upon anæsthetics in cases where the heart is already so apt to be most seriously weakened.

Mr. Owen speaks favorably of Macewen's method of performing osteotomy above the condyles of the femur, and gives a very good illustration of its mechanical principles, yet, oddly enough, says that he prefers to do the operation from the outside of the limb, thereby entirely destroying the wedge shape of the osseous incision, upon which Macewen properly

lays much stress. This operation has grown into deserved popularity, and is so extensively adopted that we are glad to notice our author directing attention to the fact that it is not entirely without danger, and one which should not be lightly undertaken. He tells of one fatal case, occurring in his own practice, and mentions others which have resulted disastrously despite the most rigid Listerian precautions. While we have not been cognizant of deaths occurring, we have known very disagreeable effects to follow this operation, although we regard it as the most satisfactory form of osteotomy.

Our author is disposed to look favorably upon the modern treatment of enlarged and degenerated glands, by removal or scraping, or when this is not possible on account of their relations and attachments, by their puncture with a red-hot needle. This treatment, so ably advocated by Treves, must commend itself to every one who has watched the tedious and unsatisfactory progress made under expectant treatment.

In common with the majority of surgeons, Mr. Owen is an advocate of circumcision in very many cases, and much prefers a cutting operation to stretching. We cannot help regarding the advice given as somewhat extreme. Our experience leads us to think, with Willard, that the operation is not infrequently unnecessarily resorted to. Nor do we share the sentiment that stretching is always an ineffectual remedy. In very many cases we have found it to be all that is required, while it has the great advantage of being much less objectionable to parents than the more bloody operation, and it can very generally be done without the administration of an anæsthetic.

We have rarely read better condensed and practical directions for the performance of lithotomy than those given by Mr. Owen. He recommends a staff with a median groove, stopping short just where the beak curves off. The beak, he advises, should be short, so that the instrument can be used as a sound as well. Our author is very imperative in insisting that the bladder should be sounded and the stone felt just before the operation is begun, and urges that the incision should be sufficiently free to allow of the ready admission of the finger into the bladder, so as to do away with the risk of the bladder being pushed before the finger without its cavity being penetrated. We believe this last item of advice to be sound, while all practical surgeons concur in the propriety of the former. He does not think highly of the suprapubic operation, holding that it is impossible to improve upon the lateral lithotomy in childhood. Mr. Owen's remarks upon incontinence in children are excellent, showing the importance of careful study and gentle treatment in these often perplexing cases. The scope of the work is so large that we could easily go on at length and pick out subjects to examine in detail, but we feel that we have done enough to convey to our readers some sense of the value of the book.

Mr. Owen avoids trespassing upon the ground given up of late to specialists, and in this he is probably right, as his field is already sufficiently large; but we confess that we should have liked to find something said about the more common forms of skin disease so frequently associated with the constitutional affections lying at the basis of so many of the ills the surgeon is compelled to treat. Then every surgeon who has had to do with institutions of which children are the inmates knows how troublesome are some of the forms of eczema, and, above all, of tinea. We should have been glad to find a sure and speedy method of

treating this latter affection, which seems to us to be quite as worthy of discussion in a surgical work as *molluscum contagiosum*, an instance of which is made the subject of a colored lithograph.

Mr. Owen writes agreeably and well, but he carries his modesty to an extreme. He has, apparently, a nervous dread of the personal pronoun, constantly saying, "one has seen," "one has heard," etc., which has a rather uncouth sound, while it diminishes the authority which attends the moderate use of the ego. Mr. Owen has written a good book, and might safely speak more often from the standpoint of his own observation. But this personal peculiarity does not detract from the value of the work, which has no superior of the same size on the subject with which it deals.

S. A.

HOW TO DRAIN A HOUSE. PRACTICAL INFORMATION FOR HOUSEHOLDERS.

By GEORGE E. WARING, JR., M. Inst. C. E., Consulting Engineer for Sanitary Drainage. 12mo. pp. 222. New York: Henry Holt & Co., 1885. London: Cassell & Co., Limited.

As stated in the title, this book was written for the information of the individual householder, and contains a description of "the best way of improving the drainage of a human habitation, and of maintaining its good sanitary condition." The author remarks in his preface that the drains in average modern houses are probably the most serious and prevalent enemies with which struggling humanity has to contend. They are, however, only incidentally enemies, never necessarily so.

The intended purposes of drains are wholly beneficial. They very often fail of their object. But with all their defects they are a great improvement over the out-of-door privies, with all that their use implies. The drainage arrangements of a house are better than they were a few years ago, and the improvement is still going on. But the better processes are not generally adopted, mainly for the reason that they are not generally known, and therefore their value cannot be fully realized. The object of these pages is to furnish a simple and direct statement of some positive knowledge and of the author's opinions about the drainage of a house, to enable the householder to comprehend thoroughly the importance of this vital element in house construction, and to adopt such processes only as have been proved to be reliable.

The book is not a complex technical treatise, nor a prolix description of various systems and appliances, but rather an outline of what the author considers the best system of house-drainage. Such a selection, based on the results of a prolonged and fruitful experience, thorough technical knowledge, and clear judgment, is authoritative, and places the public in possession of a source of knowledge of great practical value in the experience of everyday life.

In the first part of the book the author calls attention to the importance of draining the site of a house to prevent dampness, and points out practical methods of excluding moisture and ground-air by proper construction of subsoil drains, foundation walls, and cellar floors. In the construction of these drains the use of agricultural drain-tiles, of small

size, say one inch and a quarter in diameter, is strongly advised, and, in order to hold the tiles in line and prevent the entrance of sand or silt, he recommends that the joints be wrapped twice around with strips of muslin, drawn tight. This plan has been found to yield most satisfactory results. He is opposed to the custom of connecting the under-drains of a house with the drain carrying foul water, and recommends an independent line in order to guard against the possible entrance of sewage and foul air.

From the seventh chapter to the close of the book, Mr. Waring gives his own views upon the subject of house-drainage, and states the grounds on which his opinions are based. The individuality of the book is its peculiar characteristic. The writer has had a large experience in drainage work, the results of which he has sketched for the benefit of others. The object of the book would preclude a discussion of the different methods of house-drainage, as well as the opinions and theories held by various writers, which would only tend to confuse the reader and detract from the usefulness of the book. The author frankly states wherein he holds opinions at variance with those commonly accepted by most writers, and gives his reasons for such belief. Apart from the disputed points, the book is a most admirable presentation of the latest and best knowledge upon the subject of house-drainage, well adapted to the wants of the people.

Mr. Waring wisely recommends that the amount of plumbing work be reduced to the lowest convenient limit; that the fixtures and pipes, so far as possible, be fully exposed to view, so as to be easily accessible; and that anything like complication in the waste-pipes be avoided. He would banish the wash-basin connected with the drainage system from the sleeping-room, and he would keep plumbing fixtures of any sort out of the cellar of a house if possible to do so.

Mr. Waring urges that all fixtures should be securely trapped, but he is inclined to discard the main trap between the house and the public sewer. He recommends that "there should always be such a trap between the house and a flush-tank or a cesspool. I am inclined to the belief that there should not be such a trap in the case of discharge into a sewer, unless it be especially foul. If it is only a great cesspool, holding the accumulated deposits of a street or larger district, or if its interior atmosphere is at all comparable in offensiveness with that of a cesspool, then a trap will be desirable; but if it has such an atmosphere as will admit of the entrance of workmen, and if its contents are carried forward in its current with reasonable completeness, I incline to the opinion that, even if no other house connected with it aids in its ventilation, it will be better that the single house under consideration should be connected without a trap." The author deftly argues his point, and his proposition to omit the main trap might be accepted if it were not for the absence of the conditions upon which omission is justified. If sewers were in general well constructed, properly flushed, and well-ventilated, the use of a main trap might be dispensed with; but, unfortunately, these important features of well-constructed and well-managed sewers are conspicuous by their absence from our present systems of sewerage, and, therefore, for the present it is far safer to adhere to the use of the intercepting trap, at least until sewers are constructed as they should be.

Caps and ventilating cowls on the tops of soil-pipes, Mr. Waring

holds to be a positive disadvantage. He favors leaving the soil-pipe entirely open at the top, but protecting it from the accidental introduction of obstructing objects by inserting into the open mouth a spherical wire basket. In order to increase the movement of air, he advises an increase in the diameter of the single upper length of the soil-pipe.

The difficulty of securing, in practice, the conditions upon which the successful use of the *back ventilation* of traps depends, has led Col. Waring to discard this device as useless in preventing the siphonage of traps. Another objection urged against this method is the increased facility which it affords for the evaporation of the water in the trap, and the greater liability to destruction of the seal. He, therefore, prefers to do away with the ventilation of traps, and use instead an antisiphonic trap of the kind invented by Mr. Putnam, which he considers the best trap thus far invented for wash-stands, bath-tubs, lavatories, etc. The description of Mr. Putnam's interesting and valuable experiments on the ventilation of traps, etc., merits a careful perusal.

Mr. Waring inveighs against the too common practice of unnecessarily multiplying the number of fixtures in a house. Simplicity is the object to be aimed at, and this has also the advantage of economy. "While it is important to avoid unnecessary cost, the economical argument is the least of all the reasons for what is here proposed. The real and controlling argument is based on the great advantage of having the fewest possible points requiring inspection and care, and to secure the most frequent possible use of every inlet into the drainage system. Reasonable convenience being always kept in view, three water-closets in an ordinary house are much better than half a dozen; and the same principle holds throughout the whole range of plumbing appliances."

The author reasonably objects to the hidden overflow and the chain and plug in bath-tubs and washstands, as they soon become fouled. For the bath-tub he advises a return to the standing waste, which may also be adapted with advantage to the washstand. For the latter he remarks that the only really cleanly device that he has seen is what is known as "Weaver's Waste." The Dececo flush-pot for sinks is a handy device, which may be substituted, with benefit, for the troublesome grease-trap. The pan closet is properly classed among the worst forms of complicated water closets. Simplicity should be the controlling feature of these fixtures. The hopper closets are the best of the cheap closets. Among the better class of closets, he describes the Dececo closet, an invention of his own, and he recommends it for use because it is perfectly successful in its working. It is without valve or moving part anywhere in the course of the outlet, objections which hold in the case of so many of the closets at present in use.

To those who live in the country and in the smaller towns, Chapter XXV. will be especially interesting, as it treats of the subject of sewage disposal for isolated houses. Ordinarily, the cesspool is the makeshift for a better method of disposal. But it is no longer necessary that this dangerous nuisance should exist. An improved method of disposal has been carefully thought out and successfully applied, and it is well adapted to isolated houses which have at least a small area of land connected with them. It is the system of subsurface intermittent drainage, which automatically disposes of organic refuse and filth contained in liquid waste, in a hidden and inodorous manner, to the great benefit of the land. This system was started by the Rev. Henry Moule, and

afterward modified and improved by Mr. Rogers Field, and finally perfected by Mr. Waring. It is now very successfully used by engineers in many parts of this country. The principle upon which this plan of disposal is based, and the method of its application, are fully described by Col. Waring in the concluding chapters of his book.

We commend this excellent little volume to physicians, as well as to the public generally. It is a clear exposition of the leading principles of house-drainage. As already remarked, Mr. Waring differs on some points from the generality of writers on the subject, but he frankly states his reasons for such opposition. The book is well printed in large, clear type, upon good paper, is well bound, and makes an exceedingly neat volume.

W. H. F.

THE PATHOLOGY AND ETIOLOGY OF CONGENITAL CLUB-FOOT. By ROBERT WILLIAM PARKER, Surgeon to the East London Hospital for Children; and SAMUEL GEORGE SHATTOCK, Curator of the Museum, St. Thomas's Hospital. Reprinted from the *Transactions of the Pathological Society of London*, 1884.

ANY researches which increase our knowledge of the etiology and pathology of congenital deformities, or tend to dispel the mystery which has heretofore surrounded them, are always most welcome. In the work now noticed, the authors have assuredly made a step in the right direction, inasmuch as they have given the results of direct observation upon the embryo, and have, so far as possible, eliminated from their studies purely theoretical considerations.

Up to the appearance of a paper by Dr. Henry W. Berg, of New York, of which we shall speak further, the existing theories of the causation of congenital talipes may be briefly summarized as, 1st. That which would ascribe the condition to pathological changes in the fœtus, analogous to post-natal diseases. 2d. Heredity. 3d. Arrest of development. 4th. Abnormal intrauterine pressure and deficiency of amniotic fluid. All these have had their supporters, but do not rest upon any practical or scientific foundation, and Messrs. Parker and Shattock have, with good reason, discarded them. They adhere to a mechanical causation, the main facts of which are set forth in their introductory argument. They show that during intrauterine life the feet occupy different positions, to allow of proper development of the structures entering into their formation prior to birth, and normal position and range of motion to follow in consequence at birth. Anything interfering mechanically with this process, either by keeping the feet fixed or preventing the normal changes in position, will produce club-foot, the variety depending upon the nature of the force acting, and the period of fœtal life at which it is applied; the severity being in direct ratio to the violence of the mechanical cause in action.

Whilst, to a certain extent, we agree with Messrs. Parker and Shattock in their conclusions, we are surprised that no allusion is made to the observations of Dr. Berg ("The Etiology of Congenital Equinovarus," Seguin's *Archives of Medicine*, Vol. VIII., No. 3, December, 1882. G. P. Putnam's Sons, New York), whose researches, made also directly upon the embryo, antedated the work under consideration over a year.

In his article, Dr. Berg describes the changes in position of the lower extremities at different periods of foetal life, such changes being brought about by the normal rotation progressing in these parts. He shows that in early foetal life there is an outward rotation of the whole limb which is accompanied by an exaggerated varus, which is normal at this period, and later by an equino-varus, which diminishes as normal rotation proceeds—any interference with this process is productive of congenital club-foot.

The similarity of both the methods of investigation employed and the conclusions reached by Dr. Berg and the authors of the present work, is quite striking, the observations having been made in different parts of the world by investigators acting wholly independent of each other. It seems, however, that the American contributor has carried his observations a step in advance of the authors, and followed them to their legitimate logical conclusions, which, for some reason, Messrs. Parker and Shattock have avoided. As the latter state that they are still pursuing their investigations, and ask for any pathological material which will throw light upon it, we would respectfully call their attention to Dr. Berg's article.

A. S. R.

MOISTURE AND DRYNESS; OR THE ANALYSIS OF ATMOSPHERIC HUMIDITIES IN THE UNITED STATES. AN ESSAY READ BEFORE THE AMERICAN CLIMATOLOGICAL ASSOCIATION IN 1884. By CHARLES DENISON, A.M., M.D., Professor of Diseases of the Chest and of Climatology, University of Denver, etc. 8vo. pp. 30. Chicago: Rand, McNally & Co., 1885.

THIS is an essay read before the American Climatological Association, in 1884, by Dr. Denison, whose investigations of the Climatology of the United States, and especially his observations of the meteorological characteristics of our far western territory, make him peculiarly well fitted to discuss the subject of climatic conditions as a therapeutic agent of practical value and application in the treatment of pulmonary disease or weakness.

The author starts out with the statement that dryness—that is, an actually small amount of atmospheric moisture—is a most important element in the best climates for phthisis. He then proceeds to the discussion of the subject of dryness in its various phases as a climatic attribute. A large amount of meteorological data is made use of in establishing his conclusions. These data are furnished by the U. S. Signal Service Bureau, and were collected at one hundred and thirty-six stations, covering the whole territory of the United States. These statistics are arranged by seasons and are tabulated in convenient form. There are also eight colored weather charts prepared by the same bureau at the request of the author through the Colorado State Medical Society. The first four charts represent the mean cloudiness in tenths, zero being no clouds, for the whole United States; the remaining four give for the seasons the absolute humidity (grains of vapor to the cubic foot of air) all over the United States. With the aid of these data the author endeavors to show that the relative humidity alone is a delusive index of

dryness; that the absolute humidity is a more important criterion. To use his own words: "A small number of grains of moisture to the cubic foot of air for a given temperature, is the most exact measure of the dryness of a given locality that we obtain from any one attribute of the atmosphere."

Temperature and elevation, with distance from the sea, are powerful factors in the production of dryness. This is illustrated by the charts for absolute humidity. It is seen that during spring, summer, and autumn, much of Wyoming, Colorado, New Mexico, Arizona, and Nevada contain one-fourth in spring, one-third in summer, and about one-fifth in autumn, as much atmospheric vapor as Florida and the gulf coast of Texas, while in winter, owing to the lessened capacity of the air to hold moisture at low temperatures, there is not one-tenth the absolute humidity in the frozen atmosphere of the elevated, northern interior section of the country there is in the atmosphere of the gulf coast.

The author takes issue with those who are in the habit of associating equability with the quality of dryness, and asserts most positively with the aid of statistics that variability is the distinguishing attribute of really dry places, while equability is, as a rule, characteristic of uniformly damp places. By a natural sequence *coldness*, *variability*, and *stimulation* are arrayed against their opposites, *warmth*, *equability*, and *enervation*. According to this distinction, he proposes a division of climate under four heads, viz.:

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|-----------------------|-----------------------|
| 1. Excessive dryness | } giving variability. |
| 2. Moderate dryness | |
| 3. Moderate moisture | } giving equability. |
| 4. Excessive moisture | |

By means of a carefully elaborated rule of moisture and dryness, the various Signal Service Stations, one hundred and thirty-six in number, are rated according to this classification for the winter of 1883, with mean temperature added. A table is also prepared showing comparison of twenty-five dry with twenty-five moist localities, chosen from the whole number of stations. The former table is a very desirable one, as the invalid needs a change of climate in the winter season, and its use will enable a choice to be made according to the requirements of the patient and the preference of the physician.

The last few pages are devoted to a consideration of the physical effects of dryness on man. Real dryness, or low absolute humidity, favors increased evaporation from the skin and lungs, and it is reasonable to suppose that this increased transpiration of vapor is a means of effecting the escape of effete matter and wasted tissue, a circumstance which probably has an important bearing on phthisis.

In conclusion, attention is drawn to the climatic characteristics, especially dryness, of the elevated interior of our continent, notably Colorado, as exerting a favorable influence on respiratory activity and on nutrition.

Dr. Denison's essay is welcomed as a fresh contribution to the climatology of the United States. Some of his views may not be accepted without further evidence, but his investigations will stimulate inquiry and lead eventually to more correct notions of climate in its medical aspects.

W. H. F.

A MANUAL OF HUMAN PHYSIOLOGY, INCLUDING HISTOLOGY AND MICROSCOPICAL ANATOMY, WITH SPECIAL REFERENCE TO THE REQUIREMENTS OF PRACTICAL MEDICINE. By DR. L. LANDOIS, Professor of Physiology and Director of the Physiological Institute, University of Griefswald. Translated from the Fourth German Edition, with Additions by WILLIAM STIRLING, M.D., S.D., Regius Professor of the Institutes of Medicine or Physiology in the University of Aberdeen. Vol. I. with 176 illustrations, pp. 514. Vol. II. with 132 illustrations, pp. 670. London: Clay & Son. Philadelphia: P. Blakiston, Son & Co., 1885.

THE popularity upon the continent of Europe of this elaborate work, where, notwithstanding the variety of physiological handbooks disseminated throughout the German Empire, four large editions have been demanded in the five years since it appeared, is justly a matter of surprise, and can scarcely be accounted for save on the ground, as asserted by the English translator, that in reality it forms a bridge between physiology and the practice of medicine, and constitutes a broad and firm highway from the study of natural healthy function to the accepted methods for rectifying disturbed and abnormal action in the diseased human organism. A careful examination of the work before us will, we think, convince any impartial reader, that the claim put forth by Dr. Stirling in favor of Prof. Landois is, at least so far as relates to the "eminent practicality" of his manual, a well-founded one. Obviously our author not only teaches his pupils how, and to what extent, pathological processes are derangements of normal activities, but also most effectively aids the busy physician to trace back from morbid phenomena the course of divergence from healthy physical operations, and to gather in this way new lights and novel indications for the comprehension and scientific treatment of the maladies which he is called upon to cope with in his daily warfare against disease.

In comparing the work of Dr. Landois with one of a standard English physiologist, such as that of the lamented Dr. Carpenter, we find, for example, in the section devoted to the "Urinary Secretion," that with the admirable additions appended by Dr. Stirling, the histology of the kidney is explained at much greater length, and with a more generous profuseness of illustration. The ordinary and abnormal constituents of the urine are very elaborately discussed, and the various urinary sediments are described and depicted with superior minuteness, instead of being dismissed with a concise, verbal account, as in Dr. Carpenter's work. On the other hand, however, this last mentioned handbook offers us more detailed investigations in regard to the functional activity of the renal organs during health, and concerning the *modus operandi* of production for sundry abnormal ingredients of the renal secretion, as manifested in different diseases of the kidneys. Still, Dr. Landois's brief but lucid exposition of the mechanism involved in "Retention and Incontinence of Urine," printed in such small type that but little space is occupied, carries out the alluring promise of the preface, in regard to bridging over the gulf between physiological and medical science. The superiority of the German work is attractively displayed in the abundant illustration allotted to this portion of the volume, renal anatomy being elucidated by no less than seven figures, including four of Prof. Tyson's

improved modifications of Klein's, and of Henle's pictures. The microscopical characters of all the common, and several unusual urinary deposits, are given in twenty-eight woodcuts, most of which are truthful and artistic, although the representations of tube-casts in Bright's disease are far from perfect, and that of sarcina is totally incorrect and misleading.

An additional feature of great practical value is exhibited in the condensed account of the "Comparative Physiology of the Urinary Apparatus," and in the brief historical *résumé* devoted to an outline sketch of the chief discoveries relating to the kidneys, from the days of Aristotle to the present time. Such a narrative of the progress of our knowledge in regard to the renal functions, not only serves to gratify a legitimate curiosity, which often forms a powerful incentive to the prosecution of diligent study, but also contributes in an agreeable manner to fix indelibly in the mind of a student the essential facts and many minor details of renal physiology and pathology.

In the labor of translation, Dr. Stirling states that he has endeavored throughout to convey the author's meaning accurately, without a too rigid adherence to the original. If, as we are told, the musical Italian tongue ought always to be written upon satin, German frequently appears harsh enough to be inscribed only upon sandpaper, and this rugged character of the language is too often manifested in English translations, where many of the unpolished and obscure Teutonic idioms are retained. Dr. Stirling has, however, presented the author's thoughts in a smooth and flowing English dress, and the shortcomings, for which he apologizes, are so few and unobtrusive, that any reader who knows by experience the difficulties of his undertaking, will pardon these insignificant failures almost before any plea for forgiveness has been offered.

J. G. R.

MANUAL OF THE DISEASES OF WOMEN, BEING A CONCISE AND SYSTEMATIC EXPOSITION OF THE THEORY AND PRACTICE OF GYNECOLOGY: FOR THE USE OF STUDENTS AND PRACTITIONERS. By CHARLES H. MAY, M.D., late House Physician to Mount Sinai Hospital New York, etc. Philadelphia: Lea Brothers & Co., 1885. London: Cassel & Co., Limited.

THIS small volume of 350 pages was prepared by its author, as he says in the preface, in answer to the request of his quiz classes, and is "intended to aid the student, who, after having carefully perused larger works, desires to review the subject; and it may also be useful to the practitioner who wishes to refresh his memory rapidly, but has not the time to consult larger works." He claims no originality for his statements, but has compiled them from "the writings of Emmet, Thomas, Mundé, Simpson, Barnes, Playfair, Duncan, Hart and Barbour, Hewitt, Tait, Schröder, Fritsch, and the lectures of Professor McLane and Dr. Tuttle, of the College of Physicians and Surgeons, New York." The work departs somewhat from the ordinary range of manuals, being, in fact, a syllabus, with occasional elaboration of the more important subjects, and embracing in small compass a vast array of heads or memoranda, to remind the reader of the associated symptoms, conditions, and

diseases, with their resemblances, which are to be considered in making a proper or differential diagnosis in any given case. Such a book cannot take the place of the more elaborate treatises on gynecology, but it may be of value in leading to a careful research for definite facts and clinical records regarding matters perhaps little known to or investigated by the reader. We also can see where it would be of value to a lecturer, as an indicator of the subjects upon which he ought to instruct his classes, and may lead to a wider field of investigation and study on his part. In the chapter upon ovariectomy we could suggest several improvements in the peritoneal toilet, closure of the abdominal wound, its dressing, etc.; but these are matters of opinion, and subject to frequent changes, based upon individual success. Too little attention is being paid to closing the abdominal wound, so as to leave the least unsightly cicatrix, and dressing it, to avoid the suppuration of the suture holes. The best suture we have seen is fishing snood, three stitches to an inch, well shot, and so inserted as to take in the parts widely on the peritoneal side, and leaving but little skin between the exit ends under the shot. The best dressing is Keith's new one, of one part of carbolic acid to eight of glycerine, applied over the wound upon absorbent cotton; this makes a dry wound, the parts healing without suppuration.

Under the head of "Extraction by Laparotomy," the author does not indicate the great danger of removing a living ectopic foetus when near or at maturity. This should be forcibly impressed upon the mind of every one who has under care a case of abdominal pregnancy with a maturing foetus,

Dr. May's work is in good, clear type, and will, no doubt, prove attractive to medical students. It is far better than any medical catechism could be.

R. P. H.

DE LA SUTURE DES NERFS À DISTANCE. Par le DR. GEORGE ASSAKY, Préparateur de Médecine Opératoire à la Faculté, etc. 8vo. pp. 80. Paris: Asselin et Houzeau, 1886.

THE SUTURE OF NERVES AFTER LOSS OF SUBSTANCE. By DR. GEORGE ASSAKY, etc.

It is not easy to translate smoothly the title to this interesting monograph, but it may doubtless be gathered from the expression we have chosen to stand for *suture à distance*, that the author discusses the subject of attempting to unite by suture the divided end of nerves, from which a certain part has been removed. His whole work depends upon the well-established fact, that the nerves are capable of extension without solution of continuity, and that this extension is followed by retraction, when the extending force is removed. He has taken pains to study this property of the nerves, both anatomically and experimentally. It appears that the elasticity of a nerve resides in the interlacing fibres of the neurilemma (of Bichat), or perineurium (of Robin). The remaining portions of the nerve appear to be passive, being smooth when it is extended, but exhibiting cross-markings (wrinkles?) when the nerve is relaxed. The extensibility of a nerve is also limited by certain extraneous connections. Thus the proximal portion

of a divided nerve can be extended downward more than the distal portion can be drawn upward. This is due to the restraining influence of the branches of the nerve which furnish so many anchors attached below, while branches situated above, do not offer any resistance to a force tending to draw the nerve downward.

The author gives a good and detailed account of the experiments he performed in a number of lower animals, to determine the effect of drawing parts of a nerve together over a gap, using for his suture cat-gut, fragments of tendon, a piece of a trachea, a strip of muscle, and a strand of silk thread. In all the experiments the material served as a sort of scaffold or guiding thread for the prolongations of newly forming nerve substance tissue.

Next he considers the different methods thus far proposed with the object of bridging a gap in a divided nerve. These are: 1. Grafting a portion of nerve from another animal of the same or of another species. 2. Grafting the peripheral end into a neighboring intact nerve. 3. Uniting the lower end of one nerve to the upper end of another simultaneously divided. 4. Union of flaps dissected up from the opposite ends of the divided nerve. 5. Tubular suture. It is hardly worth while to sketch the argument of our author in regard to the respective merits of these different methods. It is enough to state that his views are consistent with the present general verdict of experimenters and students, that no living or dead tissue, whether from the body of another subject or from that of the same one, introduced between the opposite ends of a divided nerve, ever serves as anything more than a scaffolding or guiding thread, along which the budding prolongations from the proximal end can travel. As to the method of suture called *à distance*, by which an attempt is made to approximate the more or less remote ends of a divided nerve, his conclusions are reasonable, and, we think, admissible, viz.: That suture of nerves after loss of substance may be of real service; that experiment upon animals shows that it hastens the regeneration of a nerve, by diminishing the interval which separates the ends, while the cicatricial tissue along the threads of the sutures is richer in newly formed nerve fibres than when the cure is left to nature alone.

It will be observed that these conclusions are not at all startling, but it may be worth all the care and labor the author has devoted to the subject, to have called attention to the reasonableness of making use for the repair of nerves, of that property which has so often been utilized in the operation of nerve-stretching.

C. W. D.

THE PRINCIPLES AND PRACTICE OF SURGERY. By FRANK HASTINGS HAMILTON, A.M., M.D., LL.D. Third edition, revised and corrected. 8vo. pp. xxxii. 989. New York: William Wood & Co., 1886.

THE eminence of the author of this volume must secure for it many readers, while the vast experience of which it is the outcome, gives weight and value to every statement of opinion which it contains. Indeed, it is as a record of personal observation that it will be chiefly

esteemed, for in these days a thoroughly satisfactory treatise upon so enormous a subject as surgery, can hardly be constructed within the narrow limits which Dr. Hamilton has allowed himself. For many years he has been an acknowledged authority upon any surgical subject of which he treats, and the ability, accuracy of observation, and acute reflective powers which have made him such, will cause every thoughtful and progressive surgeon to give careful consideration to any estimate he places upon new methods and highly vaunted plans of treatment.

Dr. Hamilton writes with much vigor, and it is never hard to understand his meaning. He does not hesitate to condemn lines of practice with which he is not in accord, and sometimes in no measured terms, fearlessly arraiging in some cases the honesty, in some cases the ignorance that he thinks supply too much of the basis upon which some methods rest. The reader will sometimes think there is rather too much heat shown for the matter in hand, and wonder at the impetuosity of the writer; yet Dr. Hamilton does not transcend the limits allowed by courtesy. Indeed, we confess to surprise that he has not sometimes gone further. Thus, he narrates the history of the case of President Garfield, clearly and succinctly, but he has not descended to the level of replying to the extraordinary and presumptuous attacks made upon the treatment there adopted.

The book is intensely practical, dealing more largely with treatment than with pathology, and it has been revised with care. As a consequence, it contains the conclusions to which its author has come after full experience with many of the most recently suggested plans of treatment. Yet some of these he has passed over in silence. Thus we have looked in vain for an expression of opinion concerning the resort to trephining upon the basis of cerebral localization, though he speaks freely of that operation undertaken to fulfil other indications. Neither does Dr. Hamilton take any notice of paracentesis pericardii. Are we to argue from this, that our author does not regard either operation as justifiable?

The book is divided into two parts, dealing with general and regional surgery, and while both are well treated, the latter will be found the most interesting, as well as the most valuable. But nowhere is there a lack of interest. In view of its author's cultured ability, and from the fact that his personality is impressed upon every page, it could not well be otherwise.

It is a pleasure to see so good and experienced a surgeon occupy the conservative position which Dr. Hamilton almost always does. That he is not timid is abundantly evidenced by many cases recorded in these pages, but that his experience has led him to question the advantage to the patient of many operations glibly proposed and fearlessly undertaken of late years, is equally evident. His opinion upon modern antiseptic methods is well known, and his concluding chapter is devoted to a consideration of primary union, and the value of antiseptics in wounds generally. This chapter is especially worthy of study. Dr. Hamilton thinks that many failures to obtain speedy union in amputations and other deep wounds involving the muscles, is partly owing to the indifference, and even roughness, with which they are treated while the patient is under the influence of an anæsthetic. He gives full credit to the beneficial effect of the Listerian doctrines, but attributes the good results obtained to the care and gentleness with which the dressings are applied,

and the free drainage provided, rather than to any direct influence of carbolic acid or bichloride solutions in antagonizing the presence of germs. This view is temperately stated, and fortified by thoughtful, judicious arguments.

We have looked upon this book as too well known to require extended analytical examination, and have only spoken of it in very general terms. It will be enough therefore, if we conclude this brief notice by saying that the student of surgery need have no hesitation in committing himself unreservedly to any treatment which its author advises, for that advice is always sound, judicious, and worthy of every confidence.

S. A.

VON ZIEMSEN'S HANDBOOK OF GENERAL THERAPEUTICS, VOL. IV. THE TREATMENT OF DISEASE BY CLIMATE, by DR. HERMANN WEBER; translated by HEINRICH POST, M.D., M.R.C.P. Lond., Physician to the German Hospital, London, etc.: and GENERAL BALNEOTHERAPEUTICS, by PROFESSOR OTTO LEICHTENSTERN; translated by JOHN MACPHERSON, M.D., Inspector-General of Hospitals (retired). Pp. 496. New York: William Wood & Co., 1885.

As admitted by the translator of the first department of this valuable work, the complete and exhaustive treatise on its subject has yet to be written, and will probably, when produced, prove the ripe fruit of researches carried on by many co-laborers in this fruitful field of sanitary science. Hence, although Dr. Weber's experience as a climatologist renders him peculiarly fitted to take his place as a contributor to such a systematic work upon the resources of climate in our endless struggle against disease, the English and American reader must expect to find many important questions, about which he turns to these pages for practical instruction and guidance, but briefly touched upon, or, it may be, entirely overlooked.

But whilst the list of sins of omission is somewhat extended, we take pleasure in saying, that the faults of commission are few and trivial in comparison.

Dr. Weber claims for his countryman von Humboldt, the honor of founding recent climatology, which, he declares, is yet in its infancy, and capable of a high degree of development, which will vastly increase its power as a remedial and prophylactic influence in nearly all derangements of human health. In dealing with the extensive array of observations in regard to climate, which has already accumulated, our author's plan is to consider first the different elements or factors of climate, and their more important modifying influences; second, to attempt a classification of the various climates, furnishing under each head a short account of the regions and places suitable for the treatment of invalids; third, to indicate what benefits may be expected from these respective climates in certain pathological conditions, or simple morbid tendencies, where actual derangement of health has not yet occurred; and lastly, to point out methods of instituting a combined system of climatic and hygienic treatment, without sending the patient far away from home, home comforts, and the sympathy of relatives and friends which, per-

haps, can alone render life enjoyable enough to stimulate the invalid to the point of carrying on the needful struggle for regaining health.

In the generally complete summary of our knowledge respecting the elements which enter into the complex idea of climate, we are surprised to find no reference, under the head of electricity, to the interesting researches published some years since by Dr. S. Weir Mitchell, which indicate that a belt of electrical disturbance surrounds and travels with areas of low barometer or storm centres, exciting attacks of neuralgia in patients predisposed to this malady. Such an omission is the more remarkable in view of the fact, that Dr. Weber states that "the physiological and pathological effects from variations in atmospheric electricity are probably of great importance."

The marine climates are subdivided by our author into, first, those with a high degree of humidity, such as Madeira, the Azores, the Sandwich Islands, and the West Indies; second, those with a medium degree of humidity, among which are classified the Mediterranean ports, and in the subgroup of cool moderately humid localities, the various resorts upon the British coasts; third, the western Riviera, Cannes, Nice, the south of Africa, Australia, etc., which make up the class of marine climates with a low degree of humidity.

In discussing the various considerations which influence our choice of climate in particular diseases, Dr. Weber classifies the different forms of phthisis in thirteen groups, specifying the appropriate resorts for most of these in such a way as to render his remarks practically useful. Under the head of prophylactic treatment of the phthisical tendency, he mentions the instructive case of four children, coming from a thoroughly consumptive stock, the father and mother (also of phthisical descent) having died of phthisis before reaching the age of thirty, and two elder children falling victims to catarrhal pneumonia before the period of puberty. By proper management, such as he points out, at certain of the English coast stations, these four have all grown up well developed, being now between twenty-five and thirty years old, and in the enjoyment of excellent health.

In his short chapter upon home climatic treatment, which is so concise as to be disappointing in its brevity, Dr. Weber contends that by making suitable alterations in a patient's habits, mode of life, and so forth, many of the advantages possessed by far distant sanatoria may be gained for those invalids who are unable, on account of the cost, or for other reasons, to migrate to foreign health resorts.

In the second portion of the work, Prof. Leichtenstern has endeavored chiefly to lay down the great principles of balneotherapeutics, without in general formulating detailed rules for the application of various kinds of baths as curative measures. The author first considers at some length the action of baths at or near the normal temperature of the body, the so-called thermally indifferent baths, and then those above and below 98.4° F.; these effects being described as influencing the change of tissue, and of the excretions, as affecting the circulation and respiration, the nervous system, not forgetting the electrical and the mechanical effects.

The baths themselves as regards their pharmaco-dynamic and therapeutic efficacy, are next described, being arranged in the groups of the simple acidulous, the alkaline, the bitter, the culinary salt, the sea baths, the iron, sulphur, and lime-containing waters. Lastly, about

thirty pages are devoted to a synopsis of the empirical indications of different drinking and bathing "cures" in individual diseases. An appendix necessary to render this valuable work more complete, gives some account of peat and slime, pine leaf and herb, sand, bark, mustard, malt, and bran baths, and also of the whey, koumiss, and grape cures.

Prof. Leichtenstern maintains that artificial saline waters, prepared in imitation of the natural ones, and used by bathing and drinking, as these are in the celebrated "cures," such as Carlsbad, which is so famous all over the world, may be rendered quite equal to those of the original springs, in their therapeutic action. Further advantages are to be found in the facts, that these imitations are much cheaper than the exported mineral waters, and that they do not contain "a useless ballast of inoperative or injurious constituents, such as gypsum, silica, alumina, and so forth." As to the belief in a wonderful and mysterious efficacy of the natural waters, current in certain medical circles and among the laity, he frankly admits that it does not seem to be even founded upon fact. If sufficient care is taken to secure unpolluted water, absolute purity of the chemicals, and chemical apparatus, and accuracy in the quantities of the ingredients, trustworthy preparations will result, and such artificial Seltzer water as that produced by Struve, and the Apollinaris furnished by Ewich, are in his opinion quite reliable. An artificial Carlsbad water which our author has used largely in his own practice, and prefers to that prepared with the famous Sprudel salt, is composed of crystallized sulphate of sodium, fifty parts, bicarbonate of sodium, twenty parts, and chloride of sodium, ten parts. When it is important to increase the peristaltic action, a larger proportion of the Glauber salts may be ordered.

The last chapter, which is devoted to employment of drinking and bathing cures in particular diseases, is full of practical suggestions, some of which we would be glad to lay before our readers did space permit.

J. G. R.

THE LANDMARKS OF SNAKE POISON LITERATURE, BEING A REVIEW OF THE MORE IMPORTANT RESEARCHES INTO THE NATURE OF SNAKE POISONS. By VINCENT RICHARDS, F.R.C.S. Ed., etc., Civil Medical Officer of Goalundo, Bengal; late member of the Indian Snake Poison Commission. Calcutta: 1885.

THE author of this most interesting little book is, we believe, well known in India as a physician of distinction, and as a member of a former government commission which notably advanced our knowledge of snake poisons. It is a book which would be attractive to lay readers, but has the better purpose of clearly saying what is and what is not known as to venoms, so as to prevent loose and useless future research. To read it might save us from propositions like that in a recent number of the *Lancet*, to treat hydrophobia by snake poison, a thing which, strange as it may seem, has already been tried by Sapolini, of Italy, and failed. Mr. Richards gives us startling accounts of the deaths in India from venom. He then considers the whole history of research as regards venom down to the latest papers, but does not include all of

Lacerda's more striking conclusions. So, also, he fails to report Dr. Mitchell's paper on the "Mechanism of the Capillary Hemorrhages." The complete research by Drs. Mitchell and Reichert, which was partially announced in their preliminary report in *The Medical News* of April 28, 1883, will probably be the greatest advance this subject has made; it is about to appear as one of the "Smithsonian Contributions."

What is now wanted is a more complete study of Indian venoms by a government commission, including physiologists and chemists, to be controlled by some acute observer like the author of this excellent book.

In this country snake poisoning has become very rare, and the serpent-slaying hog has saved us many lives. Superstition, as in favor of the snake, prevents his destruction in India, and the Eastern antipathy to the hog perhaps interferes with the availability of this valuable exterminator of poisonous reptiles. The volume bears a dedication to Dr. Weir Mitchell.

G. H.

HEALTH REPORTS.

1. SEVENTH ANNUAL REPORT OF THE STATE BOARD OF HEALTH OF ILLINOIS, WITH AN APPENDIX CONTAINING THE SANITARY PUBLICATIONS OF THE BOARD DURING 1884. 8vo. pp. 613. Springfield: 1885.
2. PROCEEDINGS AND ADDRESSES AT THE SANITARY CONVENTION HELD AT YPSILANTI, MICHIGAN, JUNE 30 AND JULY 1, 1885. 8vo. pp. 173. Lansing: 1886.
3. NINTH REPORT OF THE STATE BOARD OF HEALTH OF WISCONSIN FOR 1885. 8vo. pp. 308. Madison: 1886.

1. The prominent features of the Illinois Health Board's work during the past year, have been the continued progress in the improvement of medical education, and the preparation to resist the importation of Asiatic cholera. As a result of the stand taken by the Board of Health, we find that there are now one hundred and ten colleges in the United States and Canada (out of a total of two hundred and thirty-three) which insist on an educational requirement as a condition for graduation, against forty-five that were thus exacting when this movement in favor of a higher standard of medical education was first originated about six years since. Attendance on three or more lecture courses is now compulsory in thirty-six colleges, and provision is made in forty-five others for a three or four years graded course. Hygiene is taught in ninety-one, and medical jurisprudence in ninety-seven institutions for medical education, whilst seven more colleges have lengthened their lecture terms to five months or over, and ten have prolonged their sessions to six months or over since the issuance of the last report.

2. The proceedings of the Ypsilanti Sanitary Convention are made up of about twenty interesting essays, several of them models in their way, and admirably calculated to awaken the people of southeastern Michigan to the inestimable value to themselves and their children of faithful hygienic work. Among the important questions considered, were the sanitary conditions and needs of school buildings and grounds, by Prof. Austin George; the prevention of communicable diseases, by

O. W. Wright, M.D., the well-known health officer of Detroit; the sources of malaria, and the past, present, and future water-supply of Ypsilanti, by various writers, and an extended address on the influence of sewerage and water-supply on the death-rate in cities, by Irwin F. Smith, of Ann Arbor. This essay is a well-written and cogent plea in favor of a proper system of sewers, the author maintaining that the general death-rate falls after the sewerage of a city, and, other things being equal, never again reaches its previous maximum.

3. From Wisconsin, we learn that the year ending Oct. 31, 1885, has been remarkably free from any extensive outbreaks of contagious disease, and, what is an almost equally worthy cause of self-congratulation, that a decided advance in favor of public hygiene throughout the community is apparent. Nevertheless, it would seem that ample room for improvement, especially in the outlying rural districts still remains, as, for example, was shown in the case of an outbreak of diphtheria in the city of Eau Claire, where the School Board at first resisted the order of the Health Board to close certain of the public schools, and gave notice that they would all be open as usual. The Board of Health, however, maintained its ground, and in the conflict of authority thus inaugurated was fully sustained by the courts.

Preparations were made throughout the State to prevent the introduction of cholera, and circulars containing the requisite information were published and very widely distributed among the citizens of Wisconsin. The same precautions, which fortunately proved needless for the summer during which they were first urged upon the people, are judiciously advocated again for this season, when the early activity of the pestilence in Italy, and certain other portions of the Mediterranean coast, appears to threaten renewed danger to the United States.

The volume is almost entirely made up of reports from local health boards, without any essays upon the sanitary problems of the day. A brief special report from the State Veterinarian mentions that glanders has been found to exist in fourteen counties, and that forty-one horses have been killed in order to limit its ravages. Only one instance of inoculation of this disease upon a human being in Wisconsin during the past year is recorded. Anthrax and tuberculosis in cattle, swine plague or "hog cholera" among pigs, and a cattle disease resembling ergotism, have made their appearance, but have been prevented by suitable sanitary precaution, from inflicting any serious ravage, up to date of publication of the report.

J. G. R.

MANUEL PRATIQUE DES MALADIES DES FOSSES NASALES ET DE LA CAVITÉ NASO-PHARYNGIENNE. Avec 53 figures dans le texte et 4 planches en lithographie, hors texte. Par le DR. E. J. MOURE, Professeur libre des Maladies du Larynx, des Oreilles et du Nez; Directeur de la Revue Mensuelle de Laryngologie, Otologie et Rhinologie, etc. 12mo. pp. 304. Paris: Octave Doin, 1886.

A CLEARLY written, comprehensive, and well-arranged manual of diseases of the nose, eminently practical, and, in the main, well abreast with the present advancement of rhinology. While dealing cleverly with

the subjects usually treated under this head, it has, besides, especially interesting chapters upon Abscess, Tuberculosis, Dermatoses, and Neuroses of Sensibility of the Nasal Fossæ.

Were we to criticise the work, it would be to suggest that the recognition of certain American methods of treatment, as, for instance, the employment of chloroform or ether in the removal of living parasites from the nasal cavities, and the use, in its many and varied applications, of Jarvis's snare *écraseur*, an instrument decidedly superior to any figured in the book. An account of the several operations now successfully employed here for the correction of deflections of the nasal septum, etc., would have added materially to its usefulness. These, however, are minor considerations amid so much which is to be commended, and the book will be read with interest and profit by those for whom it is intended.

D. B. D.

CLINICAL STUDIES ON DISEASES OF THE EYE, INCLUDING THOSE OF THE CONJUNCTIVA, CORNEA, SCLEROTIC, IRIS, AND CILIARY BODY. By DR. FERDINAND RITTER VON ARLT, Professor of Ophthalmology in Vienna. Translated by LYMAN WARE, M.D., of Chicago. 8vo. pp. 325. Philadelphia: P. Blakiston, Son & Co., 1885.

UPON the view that inflammation, wherever found, is to be combated upon certain general principles, almost all medical men are ready to undertake the treatment of the "common inflammations" of the eye." Whatever of fallacy there may be in such a view, and whatever of risk there is in such an undertaking, is revealed by the perusal of a work like this. The author's purpose has been "primarily to give the physicians engaged in general practice a book of reference which they could consult regarding the common and most frequent diseases of the eye." A worthy object! But, we fear, followed with self-defeating zeal. For only special interest, or a very unusual desire for thoroughness, will lead one to give this treatise, of three hundred and twenty well-filled octavo pages, the attention it deserves. He who does give it such consideration, however, can hardly fail to thank author and translator for their thorough work.

Clinical study is, of course, something very different from book-making, or book-using; yet, in the sense in which a book may bear such a title, this one deserves it, revealing, as it does, the wealth of the clinical experience of the author, and constituting an accurate and most suggestive guide to the clinical studies of the reader. It contains little that is entirely new to ophthalmic science, but gives a most complete *résumé* of our present knowledge, full justice being done to subjects of such recent interest as vernal conjunctivitis, and the use of the actual cautery in corneal abscess. It does not grapple with pathogenic bacteria; and the translator has found it worth while to interject brief allusions to the uses of jequirity and cocaine. The book is practically destitute of illustrations, has a fair supply of foot-notes and references, and in presswork bears the stamp of Philadelphia excellence. It is a volume which will prove a valuable addition to the working library of the thorough ophthalmic surgeon.

E. J.

QUARTERLY SUMMARY

OF THE

PROGRESS OF MEDICAL SCIENCE.

A N A T O M Y .

UNDER THE CHARGE OF

GEORGE D. THANE, M.R.C.S. ENG.,
PROFESSOR OF ANATOMY AT UNIVERSITY COLLEGE, LONDON.

THE LUMBAR CURVE OF THE SPINE IN SEVERAL RACES OF MEN.

The characteristic lumbar curvature of the human spine is the result of the conformation of the vertebral bodies and of the intervertebral disks. The degree of curvature can only be ascertained with precision by measurements carried out on sections of frozen bodies; but in the absence of fresh subjects of different races, some indications may be obtained by comparing the relative depth of the vertebral bodies in front and behind. SIR WILLIAM TURNER finds that in Europeans the first and second lumbar vertebræ are generally thicker behind than in front; that in the third and fourth the bodies are generally deeper in front; and that the fifth is always characterized by a greater proportional anterior depth. In negroes, Andamanese, and especially Australians, the upper lumbar vertebræ show a greater preponderance of the posterior vertical diameter, while the fourth and fifth are relatively shallower in front, so that, unless the differences in the form of the bones are neutralized by the disks, the lumbar spine is less curved in those races. To express the relation of the anterior and posterior depths, a lumbar index is calculated, the anterior vertical diameter being taken as the standard—100. The average index of the five lumbar vertebræ in 12 Europeans is 95; in 2 Esquimaux, 98.3; in 2 Lapps, 98.3; in 3 negroes, 98.9; in 2 Andamanese, 99; in 2 Sandwich Islanders, 104.7; and in 5 Australians, 105.8. The lowest index met with is 84.8, in a Chinese skeleton, and the highest 106, in a Bushman. One Malay skeleton gives an index of 98, and one Maori 100. Spines with a lumbar index are termed *koilo-rachie*; those with an index from 102 to 98, both inclusive, are *ortho-rachie*; and those with an index below 98 are *kurto-rachie*.—*Journal of Anatomy and Physiology*, April, 1886.

ON THE MORPHOLOGY OF THE TARSUS.

The development of the astragalus, and the significance of the ossicle termed by Bardeleben *os trigonum*, are discussed by G. BAUR in the January number

of Gegenbaur's *Morphologisches Jahrbuch*. After a critical analysis of the literature relating to this subject, the author gives a summary of his own observations. The ossicle in question is present in many marsupials, but it does not occur normally in the monotremata, nor in any of the eutheria, in all of which the astragalus is developed from a single cartilage. The division of the cartilaginous astragalus in the human fetus described by Bardeleben does not exist. Baur regards the supernumerary ossicle occasionally found in man at the back of the astragalus as the homologue of the os trigonum of marsupials, and considers it probable that a similar ossicle may occur as a variety in other mammals, but that it has not yet been recognized, owing to the relatively small number of individuals examined. He doubts the correctness of Bardeleben's view that the os trigonum is the intermedium tarsi, being inclined rather to regard it as a sesamoid bone, and not as a typical tarsal element, since it appears to be developed in marsupials later than the true tarsal bones. The so-called tibial sesamoid bone would then be the tibiale, and the astragalus, which, being developed from a single cartilage, represents only one element, would be the intermedium.

ON THE CONDITION OF THE UMBILICAL VEIN AFTER BIRTH, AND ITS ANASTOMOSES WITH THE VEINS OF THE ABDOMINAL WALL.

E. WERTHEIMER confirms the statement of Baumgarten that in a majority of cases there is a small vein in the centre of the round ligament of the liver in the hepatic part of its extent, but regards this as a newly formed vessel, and not as a persistent portion of the umbilical vein. In the infant the lumen of the umbilical vein speedily becomes closed by a plug of connective tissue, and this plug is subsequently excavated by the central vein, for which the designation *centro-umbilical* is proposed, and which is continuous with similar small veins in the peripheral part of the round ligament. The centro-umbilical vein opens above into the left branch of the portal vein, either directly or by the intervention of the upper end of the umbilical vein, which, as observed by Sappey, may remain pervious for a distance of one or two centimetres.

In two fetuses, and in five out of eleven infants, Wertheimer found a vestige of the venous network of the abdominal wall which opens into the allantoic veins in early foetal life, in the form of a small vessel connecting the umbilical and epigastric veins, similar to that described by Burow, but he believes that this communication is not present as a rule at the time of birth, and that when so it subsequently becomes obliterated with the umbilical vein. In certain rare cases of anomaly, such as those described by Monro, Ménière, Manec, Klob, and others, the umbilical vein and its communication with the epigastric remain patent, giving rise to a channel uniting the portal and iliac veins, homologous with the anterior abdominal vein of batrachians. —*Journal de l'Anatomie et de la Physiologie*, February, 1886.

ON THE RUDIMENT OF A SEPTAL GLAND IN THE HUMAN NOSE.

The tubular recess at the lower and forepart of the nasal septum of man is commonly regarded as a rudiment of the organ of Jacobson of other mammals, Kölliker's interpretation having been generally accepted by

anatomists. C. GEGENBAUR points out (*Morphologisches Jahrbuch*, January, 1886), however, two objections to this view, viz., the situation of the opening above the floor of the nasal cavity, and the relation of the tube to the cartilage of Jacobson. Gegenbaur believes that this structure is a vestige of a considerable gland of the nasal septum which he has discovered in lemurs (Stenops). The objection that the mode of development of this tube is different from that of glands generally is met by Kangro's observation that the large gland of the outer wall of the nose of mammals (Stenson's gland) makes its first appearance as a tubular hollow. In Gegenbaur's opinion, a representative of Jacobson's organ has not yet been demonstrated in man.

ON THE RELATION BETWEEN THE CALIBRE OF THE BRONCHI AND THE VOLUME OF THE LUNGS.

W. BRAUNE and H. STAHEL describe (*Archiv f. Anatomie*, February, 1886) an extensive series of observations upon the calibre of the large air-tubes, considered especially in relation to the capacity of the lungs. The trachea and bronchi were removed from the body, and either hardened in chromic acid or frozen. Transverse sections were then made at certain definite spots, and the area of these carefully measured. That the results are trustworthy is shown by the close agreement that was found to exist between the area of the right and left bronchi and the weights of the corresponding lungs. In five cases the average weight of the right lung to that of the left was in the proportion of 100:74.9, the section of the right bronchus to that of the left as 100:75.5. The greatest individual deviation from the average proportion was left lung 74.8, and left bronchus 78. The following is a summary of the results obtained:

The trachea is smallest immediately below the larynx; its calibre increases gradually to about the middle of its length, and then diminishes to about three centimetres above the bifurcation, from which spot it again enlarges to its end. The continuous enlargement from above down, observed by Aeby, is explained as being due to the pressure of the column of fusible metal, with which the air-tubes were filled by him before being measured, distending unduly the lower part of the trachea.

The sum of the sections of the two bronchi at their beginning is greater than the sections of the trachea 3 cm. above the bifurcation, the average proportion being 107.9:100; the extremes 122.8 and 85.7:100. In only two cases out of ten were the bronchi together smaller than the trachea.

The calibre of the right bronchus at its origin to that of the left is on the average as 100:77.9, the extremes in eleven cases being 100:71.6 and 100:83.3. The calibre of the left bronchus usually diminishes from its origin to its termination. The right bronchus is too short to allow of observations being made upon it.

The section of each bronchus at its origin is normally greater than the sum of the sections of its primary branches. One exception to this rule was found in six cases. The same relations were found to exist between the trachea and the right and left bronchi in the dog, cat, and sheep.

There is a constant relation between the weight of the lung and the calibre of its bronchus. In dogs the relative capacity and weight of the right and

left lungs were found to correspond closely, whence it is inferred that the calibre of the bronchi is directly proportionate to the capacity of the lungs.

A definite relation between the calibre of the bronchi and the capacity of the lungs is also shown in pathological conditions. An emphysematous lung or lobe of a lung has an enlarged bronchus or primary bronchial branch, while affections causing a reduction in the respiratory capacity of the lung are accompanied by a diminution of the corresponding bronchus. The calibre of a bronchus depends upon the volume of air that traverses it. If the volume of air increases, the calibre of the bronchus also becomes increased, and *vice versa*.

ON SOME POINTS IN THE ANATOMY OF THE THYROID GLAND.

A. STRECKEISEN deals in a long article in the January and February numbers of Virchow's *Archiv* with the pyramidal process of the thyroid gland, the muscles of the gland, the thyroid arteries, and accessory glands and cysts in the hyoid region. His observations were made in the Pathological Institute at Basle, in a district where goitre is endemic and very common.

A pyramidal process is present, including cases of occurrence of a superior accessory gland which evidently arises from the separation of this process either before or after birth, in 79 per cent. of 153 subjects examined. It springs, in the great majority of instances, from one of the lateral lobes, from right and left with equal frequency, and comparatively seldom from the isthmus. The process is nearly always connected to the hyoid bone, either by continuous gland substance or by dense connective tissue, or by a special muscle. A superior accessory gland occurs in 16.3 per cent. That most of such glands result from the detachment of a pyramidal process is shown by their greater relative frequency in old than in young persons, and by the interval between the accessory and the main gland often coinciding with the edge of one of the laryngeal cartilages, which would appear to have been concerned in producing the separation.

A *musculus glandulæ thyroidæ* occurs in nearly forty per cent. of subjects. It may be connected either with a pyramidal process or with the body of the gland. In the former case the muscle may be a *hyo-pyramidalis*, the more frequent form, derived from the thyro-hyoid or occasionally from the sterno-hyoid, or a *thyro-pyramidalis* derived from the sterno-thyroid; in rare cases a muscular bundle runs transversely from the lower edge of the thyroid cartilage to the pyramidal process. To the body of the gland fasciculi may proceed from the thyro-hyoid (*hyo-glandularis lateralis*—the commonest of these accessory muscles), from the crico-thyroid, or from the inferior constrictor of the pharynx.

The superior thyroid artery meets the gland at the apex of the lateral lobe, where it usually divides into two branches. The posterior branch supplies the upper and outer part of the lobe; the anterior branch (*ramus thyroideus*) descends along the concave upper margin of the gland to the isthmus. It commonly happens that the anterior branch of one side crosses the middle line at the upper edge of the isthmus, simulating an anastomotic loop. In many cases a considerable branch (*ramus thyroideus anterior*) descends over the crico-thyroid membrane and the front of the cricoid cartilage to the isthmus of the gland; such a vessel, crossing the middle of the cricoid carti-

lage, was found fourteen times in forty subjects. Anastomoses between the right and left arteries are scanty.

The trunk of the inferior thyroid artery sinks behind the lower part of the lateral lobe of the gland, and divides into upper and lower primary branches. The lower branch is distributed to the inferior part of the gland; the upper division ends in two branches, one of which (*ramus marginalis*) ascends along the hinder margin of the lobe nearly to its apex, while the other (*ramus perforans*) passes forward through the suspensory ligament close below the cricoid cartilage to the upper border of the isthmus. The last branch is sometimes of large size, and may extend over to the opposite lateral lobe.

An *arteria thyroidea ima* was found 12 times in 120 subjects. Its origin was from the innominate in 6 cases, from the right common carotid in 2, and from the right subclavian in 4.

Accessory glands in the neighborhood of the hyoid bone are of very frequent occurrence, and are classified by the author in the following four groups according to their situation: 1. *Prehyoid glands*, superficial to the mylo-hyoid muscle; 2. *Suprahyoid glands*, between or in the substance of the genio-hyoid muscles; 3. *Epihyoid glands*, above the genio-hyoid muscles; and, 4. *Intra-hyoid glands*, lodged in hollows of the hyoid bone. Together with the glands, small cysts lined with ciliated epithelium are often met with in the same positions, and also at the apex of the pyramidal process. In one case a duct was found leading from the foramen cæcum of the tongue to an epihyoid gland. All these structures, as well as the pyramidal process and the superior accessory gland before referred to, have a common origin, being remains of the neck of the central diverticulum which is protruded from the ventral wall of the pharynx in the embryo, and from which the middle part of the thyroid gland is formed. The author concludes from his researches that the foramen cæcum indicates the spot where this diverticulum leaves the pharynx; and since his paper was completed, the third part of His's *Anatomie menschlicher Embryonen* has appeared, in which this relation between the foramen cæcum and the thyroid body is traced developmentally. He differs from His, however, in making the thyroid diverticulum descend on the ventral aspect of the hyoid bone, and considers it probable that the development of the latter is concerned in bringing about the separation of the thyroid body from the pharynx. Accessory glands near the great cornu of the hyoid bone are much rarer than the mesial ones; they are derived in a similar way from the lateral diverticula which form the lobes of the main gland.

ON THE CONSTITUTION OF THE LATERAL COLUMN OF THE SPINAL CORD, AND ON THE ORIGIN OF THE ASCENDING ROOT OF THE FIFTH NERVE.

PROF. W. BECHTEREW, of Kasan, distinguishes a region of the lateral column of the spinal cord, placed immediately in front of the posterior nerve-roots, between these and the crossed pyramidal tract. The fibres of this part differ from those of the neighboring territories by their small size; and they begin to acquire their medullary sheath in fetuses about thirty-three centimetres in length, at a time when the posterior columns are completely medullated, while the pyramidal tracts still consist altogether of pale fibres. The name *posterior root-area of the lateral column* is given to this region, since it is

composed of the small fibres of the posterior roots, which ascend for a short distance at the outer part of the substantia gelatinosa, and then turn inward to the posterior horn, the author's observations on the fœtal cord confirming the description given by Lessauer, who found this area degenerated in tabes dorsalis. The fibres of the ascending root of the fifth nerve are medullated in fœtuses from twenty-five to twenty-eight centimetres long. They can then be seen arising in the lower part of the medulla oblongata from the cells of the base of the posterior horn, being placed internal and anterior to the gelatinous substance of Rolando. They pass outward through the latter about the level of the upper decussation to gain its outer surface, along which they ascend. They have no origin from the substantia gelatinosa.—*Archiv für Anatomie*, February, 1886.

PHYSIOLOGY.

UNDER THE CHARGE OF

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FUNCTION OF THE POSTERIOR CEREBRAL COMMISSURE.

Working under Goltz's direction, DARKSCHEWITSCH, of Moscow, performed a series of experiments on the effects produced by cutting through the posterior commissure of the rabbit's brain, and has arrived at the following general conclusions. A lesion of the posterior commissure is always followed by a lessening of the excitability of both of the third cranial nerves—*oculomotorii*. The degree of depression in excitability bears a relation to the amount of the lesion of the fibres of the commissure. Complete destruction of the commissure is followed by loss of function of the *oculomotorii*, which is as complete as if the nerves were cut. The incomplete unilateral lesion of the fibres of the posterior commissure induces an irregular or one-sided lowering of the excitability of the two *oculomotorii*; the *oculomotorius* of the side at which the lesion is greater is less excitable than that of the other side.—*Archiv f. d. gesammte Physiologie, etc.*, Bd. xxxviii. p. 120, January 26, 1886.

IRRITABILITY OF THE SPINAL CORD.

M. SCHIFF having discussed the recent work of Mendelssohn, Gad, Biedermann, etc, on the above subject—in which some evidence had been brought forward tending to prove that the stimulation of the anterior columns of the cord was responded to by movements—gives the details of a series of experiments, mostly performed in conjunction with Prof. Reichert, of Philadelphia, upon the spinal cords of rabbits. He explains the apparently direct motor response after stimulation of the anterior columns of the frog in the same way as the recurrent sensibility of the anterior roots of the spinal nerves was accounted for by Bernard; *i. e.*, by supposing that there exist in these col-

umns some sensory fibres the stimulation of which elicits reflex movements; and he thinks that the motor conducting elements are not capable of direct excitation, as is probable from the analogy to be drawn from the warm-blooded animals. He concludes that the conductors of motor impulses in the cord of mammals do not respond to stimulation, or are *kinosodic*. In spite of the complete confirmation given to Biedermann's results as to the anterior columns of the frog's cord, there is no reason to conclude that they differ from those of the mammal by possessing motor excitability. They do, however, possess a sensory excitability.—*Archiv f. d. gesammte Physiologie*, Bd. xxxviii. p. 182, January 26, 1886.

VISCERAL AND VASOMOTOR NERVES.

A remarkable paper by DR. W. H. GASKELL on the structure, distribution, and function of the nerves which innervate the visceral and vascular systems occupies the first part of the seventh volume of the *Journal of Physiology*, and appears as the first of a series promised by the author on the above subject. The investigation was chiefly carried out on the dog, to which animal the author at present restricts his conclusions.

In the present paper he confines himself to the efferent nerves, which he divides into—1. Nerves of the vascular muscles: (*a*) vasomotor—*i. e.*, vasoconstrictors, accelerators, and augmentors of the heart; (*b*) vaso-inhibitory—*i. e.*, vasodilators and inhibitors of the heart. 2. Nerves of visceral muscles: (*a*) visceromotor; (*b*) visceroinhibitory.

Those nerves issuing from the central nervous system by the branches known anatomically as *visceral*, pass by routes—which differ in the thoracic, lumbar, and cervical regions—to the ganglia of the visceral system, which are divided into three sets, viz.: 1. Lateral vertebral (sympathetic ganglia). 2. Prevertebral or collateral (semilunar, mesenteric, etc., ganglia.) 3. Terminal ganglia in the organs themselves, besides the ganglia on the roots of the spinal nerves with which also the visceral nerves may have connections. In the sacral region the nerves pass out from the second and third sacral roots in a single stream to the ganglia of the collateral chain. From the thoracic region, from between the second thoracic and second lumbar nerves inclusive, they pass out in a double stream, one to the ganglia of the lateral chain, the other to the ganglia of the collateral chain. From the upper cervical region they pass out in a single stream to the ganglia on the main stems of the vagus and glossopharyngeal nerves, along the roots of these nerves and that of the spinal accessory. The gray fibres lying in the *rami communicantes* are merely peripheral nerves passing from the lateral ganglia to be distributed to the vertebral tissues; the white fibres alone then really constitute the visceral branch of the spinal nerve, and the outflow of visceral nerves from the central nervous system into the so-called sympathetic system takes place by their means alone. The absence of the white fibres in the communicating branches in the other parts of the cervical and lumbar regions indicates the localization of the outflow to the regions named. The white visceral branches are made up of peculiarly small medullated fibres which are taken as being characteristic of these special nerves.

With regard to the *vasomotor* nerves, it is decided that the vasoconstrictor nerves for all parts of the body can be traced as bundles of the finest medul-

lated fibres (varying in size from 1.8μ to 3.6μ) in the anterior roots of all the spinal nerves between the second thoracic and second lumbar inclusive, along the corresponding visceral branch to the lateral chain (main sympathetic chain), where they become non-medullated, and are thence distributed to their destination either directly or after communication with other ganglia. Since in mammals all the vasoconstrictor nerves of the body leave the central nervous system in the outflowing stream in the thoracic region, and all pass in that branch of the stream which is in connection with the lateral ganglia when they lose their medulla, this chain might be more appropriately called "the chain of vasomotor ganglia."

The point of the outflow of the *visceromotor* nerves is widely separated from the thoracic region. The nerves upon which the peristaltic contraction of the thoracic portion of the œsophagus, stomach, and intestines depends, leave the central nervous system in the outflow of fine medullated visceral nerves which occurs in the upper part of the cervical region, and pass by the way of the visceral branches of the accessory and vagus nerves to the ganglion trunci vagi, where they become non-medullated. They therefore resemble in their structure, and in the method of their distribution, the vasomotor nerves already described. A corresponding set of visceromotor nerves for the organs in the pelvis springs from the sacral outflow. The *vasoinhibitory* nerves seem to conform to the type of the cardioinhibitory nerves, with which they may be classed. Certainly those vasoinhibitory nerves of which we know most (in chorda tympani and nervi erigentes) seem to leave the central nervous system among the fine medullated nerves which help to form the cervico-cranial and sacral rami viscerales, and pass, without altering their character, into the distal or terminal ganglia. Little being known about *visceroinhibitory* nerves, it can only be concluded in reference to them that the inhibitory nerves of the circular muscles of the alimentary canal and its appendages leave the central nervous system in the anterior roots, and pass out among the fine medullated fibres of the rami viscerales into the distal or terminal ganglia without communication with the proximal (lateral) ganglia. The nerves which supply the muscles of the vascular and visceral systems have then certain common histological characteristics, being all composed of medullated fibres of the finest size; and further, the nerves of the same function possess in addition a well-defined anatomical course. The ganglia, besides presiding over the nutrition of the nerves passing from them to the periphery, have the function of converting the medullated into non-medullated fibres and increasing the number of nerve fibres simultaneously with the loss of the medulla. It may be said, then, that each visceral fibre leaves the central nervous system as a fine medullated nerve fibre, which passes directly to its appropriate ganglion, and there, in consequence of communication with one or more of the ganglion cells, loses its medulla and passes out, not as a single non-medullated fibre, but as a group of non-medullated fibres.

In considering the nature of the action of the motor and inhibitory nerves of the vascular and visceral systems, the chief stress is laid on the cardiac innervation. Here two nerves, antagonistic in their action, are known. The sympathetic, which may be termed motor, because it augments the activity of the cardiac muscle, and this augmentation is followed by exhaustion; and

the vagus, which is the inhibitory nerve capable of lowering the excitability and conductivity of the cardiac muscle, diminishing the contractions and slowing the rhythm. This moderation of activity is productive of a beneficial effect on the tissue; the result of stimulating these nerves, then, exactly opposite. In the one case (sympathetic) there is increased activity followed by exhaustion, symptoms of *katabolic* action; in the other (vagus), diminished activity followed by repair of functions, symptoms of *anabolic* action. It is supposed to be probable that every tissue is thus supplied with exciting (katabolic) and calming (anabolic) nerves, by the mutual action of which their functional activity, and consequently their chemical interchanges and nutrition, is regulated. With regard to the central origin of the visceral branches of the spinal nerves, attention is called to the fact that Clarke's vesicular column of the spinal cord may be regarded as a discontinuous column, the cell-groups of which it is composed being limited to definite and separate regions, viz., cervico-cranial, thoracic, and sacral. This vesicular column is most conspicuous in the thoracic region, commencing about the origin of the second thoracic nerve, and continuing along the whole thoracic part of the cord to about the origin of the second lumbar nerves; it corresponds absolutely to the region of the thoracic outflow of visceral nerves. Below the level of the second lumbar, in the sacral region, there is a localized nucleus of cells belonging to this cell-column, known as "Stilling's sacral nucleus." This corresponds to the outflow of the sacral visceral nerves. On the level of the second cervical nerve, this column of cells again makes its appearance, forming the so-called cervical nucleus, the continuation of which leads into the nuclei of the vagus, and glossopharyngeal nerves. From this it is considered conclusively proved that the cells of Clarke's column are confined to those regions of the central nervous system which give rise to the nervi viscerales.

Considering the nerve-roots which arise from the upper cervical segments as typical, all spinal nerves may be said to be formed of three roots, viz.: (1) An anterior non-ganglionated root in connection with the cells of the anterior horn. (2) A posterior ganglionated root in connection with the cells of the posterior horn. (3) A lateral root, again divisible into (a) a ganglionated root in connection with Clarke's column; (b) a non-ganglionated root in connection with the cells of the lateral column. In accordance with the distribution of the fibres contained in these roots, the origin of the nerve of each spinal segment may be described as follows: (1) A somatic root composed of two portions, a ganglionated and non-ganglionated, arising from two columns of nerve cells, viz., the columns of the posterior and anterior horns respectively. (2) A splanchnic root composed also of two portions, a ganglionated and a non-ganglionated, arising also from two columns of nerve-cells, viz., the column of Clarke and that of the lateral column. The resemblance in the structure of these nerves points to the conclusion that the ganglia of the sympathetic system are homologous to the ganglion trunci vagi, and form the ganglionated portion of the splanchnic roots.

The relationship of the cranial nerves is worked out on the same system, for which reference must be made to the original.—*Journal of Physiology*, January, 1886, vol. vii. No. 1.

DEVELOPMENT OF THE SYMPATHETIC NERVE.

OXODI, in a third paper on the above subject, gives many details of the earlier steps in the growth of the sympathetic ganglia, etc., from which the following may be concluded: The intervertebral ganglia are immediate products of the process of cell-proliferation occurring in the medullary tube. Both the anterior and posterior roots appear as fine fibres growing out of the medullary tube, the anterior being the first to appear. The sympathetic ganglia are the direct products of the process of cell-proliferation which takes place on the ventral aspect of the intervertebral ganglia. They are made separate ganglia by subsequent constrictions. The sympathetic cord is a secondary product, the result of an outgrowth from the adjacent ganglia. The visceral networks and ganglia are direct products of the sympathetic cord. Each sympathetic ganglion is connected with the intervertebral ganglion, the anterior root, and the anterior and posterior branches of the spinal nerves. The fibres from the spinal cord pass with a definite system to the sympathetic; in the upper thoracic region most of the bundles pass upward, in the lower part of the spinal cord the greater number of bundles pass in a downward direction. The terminal ganglionic cells in the organs probably have a separate origin.—*Arch. f. Mikroskop. Anatom.*, March 5, 1886.

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

UNDER THE CHARGE OF

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THE BARK OF QUEBRACHO BLANCO AND ITS ACTIVE PRINCIPLES.

Under this caption, MM. CHARLES ÉLOY and HENRI HUCHARD publish, in the *Archives de Physiologie, Normale et Pathologiques*, etc., for April, 1886, an exhaustive paper. We lay before our readers some of the more important of their observations:

The active principles of quebracho are aspidospermine, quebrachine, aspidospermatine, hypoquebrachine, aspidosamine, and quebrachamine.

The physiological action and poisonous properties of the pure aspidospermine are shown in the following phenomena produced in the rabbit and the dog, by a two per cent. solution:

a. Action on voluntary movements. After doses of eight to fifteen centigrammes, successively administered, aspidospermine produces convulsions which first appear in the posterior members, and afterward become general; then muscular tremblings, and, when elimination does not take place, paralysis.

b. Action on sensibility. In no case has the peripheric sensibility been weakened. However, in the rabbit, they have ascertained the augmentation of the electrical excitability of the phrenic nerve.

c. Action on the circulation. Under its influence, the frequency of the cardiac pulsations became less; from 156 their number is diminished to 126. At the same time there were noticed an intensely red coloration and turgescence of the vessels of the pavilion of the rabbit's ear.

d. Action on respiration. Aspidospermine modifies the respiratory movements, first and temporarily in amplitude, later and permanently in frequency.

e. Action on temperature. The lowering of the rectal temperature is constant under the influence of this agent, and appears in relation at the same time with the activity of the elimination and with the dose administered. To judge of the antithermic value of aspidospermine, it is therefore necessary to take notice at the same time of the dose employed and of the activity of the elimination.

Physiological action and poisonous properties of the lactate of quebrachine. The investigations were made with a one per cent. solution on guinea-pigs and rabbits. The following are the conclusions:

a. Action on motility. Five or ten minutes after the subcutaneous injection, violent convulsions are observed; soon they give place to a paralysis of the posterior members, becoming general afterward. Besides, an almost constant phenomenon observed is the change in the guinea-pig's voice, which becomes hoarse, and later is lost.

b. The reflex excitability so increases that moderate excitations provoke distant violent muscular contractions. The sensibility does not seem to lessen.

c. The modifications of temperature are considerable. Five minutes after the first injection, the temperature of the guinea-pig diminishes, and when the doses are small the thermometer is lowered from five to seven degrees in the space of ninety to one hundred minutes. An increase in quantity of urine was observed. After large and manifestly poisonous doses, asphyxia and death occurred rapidly.

d. Respiration does not undergo modifications comparable to those induced by aspidospermine. After physiological doses, the rabbit preserved the rhythm and amplitude of the respiratory movements.

e. Action on the blood. The color of the blood is more variable; and, in grouping the observations, it was noticed that it is black when the animals succumb to asphyxia by paralysis of the respiratory muscles, and red when the thermogenic depression is more considerable.

f. The secretions increased every time when the experiment was sufficiently prolonged. Increase of the diuresis of rabbits and guinea-pigs and the humidity of the buccal cavity bear witness to the elimination of quebrachine by the buccal glands and by the kidneys. It is in direct relation to the lowering of the rectal temperature.

In equal weights and in the same experimental conditions, quebrachine is more active and more poisonous than aspidospermine; it possesses a greater antipyretic action, but does not modify the rhythm of the respiratory movements.

The physiological action and toxic qualities of aspidospermatine. The watery solution of lactate of aspidospermatine was used upon guinea-pigs and rabbits.

a. Under its influence the *motility* weakens; and if the dose is toxic, convulsions are produced. If the dose is less considerable, there is a muscular paresis of the extremities.

b. The sensibility is preserved.

c. The circulation is modified, and in the guinea-pig they have noticed acceleration of the cardiac pulsations.

d. The respiration preserves its rhythm in guinea-pigs. In an experiment upon a rabbit, we have remarked a decrease in the amplitude of the respiratory movements, compensated for by an increase of their frequency.

e. The temperature is lowered when the aspidospermatine is administered in successive doses. This lowering varies from three to six degrees in a space of time from nineteen to twenty minutes, so that in the relation of time and doses it is represented by the numbers 1, 1.5, 2.5. The aspidospermatine must then be regarded as a powerful antipyretic.

f. Its action upon the blood is interpreted by the changes of coloring like those which the aspidospermine produces. The blood of the veins becomes red, but only in cases of a gradual decline in temperature.

g. The intestinal and urinary secretions increase, and thus the slowness with which the toxic phenomena are developed is explained. The intestines and the kidneys then increase the elimination of this substance.

h. The first appearance of all these phenomena is observed in from three to five minutes after the subcutaneous injection; it is slower, and is only manifested between the sixteenth and twentieth minute, when diarrhœa and an intestinal hypersecretion exist.

By its antipyretic properties, aspidospermatine equals and even surpasses the other immediate principles of the bark of quebracho.

Physiological action and toxic properties of sulphate of hypoquebrachine on motility. A large dose (two per cent. solution) lessens motility, but in somewhat smaller doses induces tonic and clonic convulsions. It does not affect sensibility, nor has it any influence over the circulation; but it lowers the temperature considerably. The blood, when large doses have been given, assumes a vermilion hue; and is black when death has been caused by large doses that paralyze respiration. It is absorbed more rapidly than is aspidospermine and quebrachine, and the action begins in four or five minutes after its hypodermatic administration.

The following are the general conclusions arrived at by the authors:

1. The active principles of quebracho modify little the general sensibility of mammals (guinea-pig, rabbit, dog). Quebrachine, hypoquebrachine, aspidospermine, and aspidospermatine, in their pure form, do not weaken this function; but the residual products of their extraction appear to diminish it.

2. In some experiments, after the administration of aspidospermine and of quebrachine, the increase of the galvanic excitability of the phrenic nerve is proved.

3. Motility is variously affected. In large doses, aspidospermine provokes convulsions; in feeble doses, tremors; in massive doses, a rapid paralysis. A remarkable phenomenon is the hoarseness and loss of voice of the animals under observation, especially guinea-pigs. This phenomenon must be attributed to the paralysis of the tensor muscles of the vocal cords.

Quebrachine produces muscular paralysis more rapidly and more manifestly. Hypoquebrachine and aspidospermatine have a similar action, but less distinct than that of aspidospermine.

The residual products provoke a complete and rapid paralysis. Beginning

at the extremities of the limbs, four or five minutes after the subcutaneous injection, this paralysis extends rapidly to the whole body, and alternates with tonic convulsions.

4. The circulation is not modified by the residual products nor by hypoquebrachine or quebrachine. By way of compensation, they have remarked retardation of the cardiac pulsations under the influence of the aspidospermatine injections.

5. It was of practical interest to review the work of preceding investigators from the point of view of the action of the principles of quebracho upon the respiration, since this bark has been extolled as a remedy for dyspnoea of various kinds.

Quebrachine changes neither the rhythm nor the extent of the respiratory movements. It is the same with the residual products and with aspidospermatine. The hypoquebrachine modifies them feebly. This rôle belongs especially to aspidospermine; it increases at first the extent of the respiratory movements in the proportion of 1 to 5 in eight or fifteen minutes; then, a moment after, it changes the rhythm in increasing their frequency in the relation of 11 to 12 (rabbit), or of 10 to 11 (dog). This increase persists during two, three, or even four hours.

This is not all; by increasing the dose, or in the absence of elimination, a disorder of the rhythm and a diminution in the extent of the respiratory movements are induced. Besides, in pursuing the experimental analysis of these phenomena, they have ascertained, first, that these modifications affected in the same way the respiratory movements of the thorax and those of the abdomen, for the parallel graphic traces of these two orders of movements show that the enlargement of the movements of the thoracic wall is already apparent at the beginning—that is to say, at the moment where the respiratory abdominal movements are not yet modified; secondly, that the number of costal respirations grow as 2 to 1; those of the ventral respirations increase as 1 to 1.

6. Consequently the aspidospermine modifies more energetically the frequency of the costal respiration than the frequency of the abdominal respiration. It is, then, right to consider it as the modifying agent of the respiratory movements, the most active among all the principles of quebracho.

7. All the active principles of quebracho have the power to modify the temperature. The residual products raise it; but this elevation seems to reënter in the category of the phenomenon of asphyxia. The aspidospermine of commerce lowers it from two to three degrees in the space of thirty to forty minutes; the pure aspidospermine following the numerical progression of $\frac{1}{2}$, 1, $1\frac{1}{2}$, etc., has relation rather with the rapidity of the elimination than with the size of the dose. The aspidospermatine makes the thermometric column descend three or six degrees in nineteen minutes, following the progression of 1, $1\frac{1}{2}$, 2, or $2\frac{1}{2}$. It is the same with the hypoquebrachine.

Of all these substances the most decidedly antipyretic is the quebrachine. In broken doses it lowers the temperature five to seven degrees in ten minutes. With the aspidospermatine, then, it possesses an antipyretic power superior to that of all the other active principles of quebracho.

8. The coloring of the venous blood merits attention. Black, when the animal suffocates under the influence of residual products; it is rose color or

current-red by the action of quebrachine, of hypoquebrachine, of aspidospermatine, and of aspidospermine—that is to say, of the principles which lower the temperature. What is the nature of this blood modification? The spectroscopic and hematologic researches that we have made with the valuable aid of M. Henocque, and by his ingenious method have proved there is a quantitative diminution and not a qualitative change in the hæmoglobin. Further, the histologic examination of the blood globules has demonstrated their integrity; they preserve both their form and reactions at different periods in the course of these observations.

9. These principles increase the secretion of the kidneys, intestinal and salivary glands. Hypoquebrachine and aspidospermine cause diarrhœa, and act as diuretics; quebrachine increases diuresis; aspidospermine the salivary secretion of the dog, the urine of the guinea-pig and of the rabbit. The residual products have the same action upon the secretory activity of the intestine and of the kidneys. It is manifest that these are methods of elimination, as has been accounted for in examining comparatively the changes of the temperature, the respiratory troubles, and the variation of the blood color.

10. Finally, in relation to their toxic power, all these constituents of quebracho can cause death. The most toxic are the residual products; next come quebrachine, hypoquebrachine, aspidospermatine, and in the last rank aspidospermine. Death occurs, either in asphyxia, by paralysis of the muscles of respiration when the doses are large, or more slowly, by the arrest of the exchanges, when the doses are physiological and the elimination partial. Therefore by the graduated use of these principles, always with the exception of the residual products, useful effects can be obtained in therapeutics.

It is sufficient to say that the bark of quebracho is not a substance medicinally inert, and that, if it does not always respond to the excessive enthusiasm of its first patrons, it merits something more than disdain or indifference.

In the observations on temperature made by the authors of this paper, we find no allusion to the remarkable decline in the body heat of rabbits, which occurs when they are kept immobile. This circumstance must vitiate any conclusions reached by the experimenters, when so important a fact is overlooked. That this normal decline of temperature affected the results in this investigation is evident from some of the experiments, in which the decline took place without any apparent explanation of the occurrence.

CALOMEL IN THE TREATMENT OF HYPERTROPHIC CIRRHOSIS AND OTHER AFFECTIONS.

As an indication of that revival which is evidently taking place in the use of mercury, according to the old antiphlogistic conception, we place before our readers some of the principal points in a paper by SACHARJIN (*Centralblatt für die gesammte Therapie*, January, 1886) under the above caption.

In diseases of the biliary ducts, Sacharjin holds that we have in calomel the most valuable remedy which the present state of therapeutics affords. The special conditions in which it is most effective, are that catarrhal thickening which succeeds to the inflammation produced by the passage of gall-stones, and in hypertrophic cirrhosis. The cases of the former are those in which,

after repeated attacks, in quick succession, of biliary colic, there is constant pain in the region of the gall-bladder, and much uneasiness is felt throughout the whole hepatic area, there being at the same time more or less feverishness. His practice consists in the administration, every hour or two, of grain doses until twelve grains are taken, after which should no cathartic action occur a dose of castor oil is given. During the administration of the calomel, and for a few days thereafter, the mouth is rinsed out with chlorate of potash solution, to avoid pytalism.

Sacharjin, like many others, has seen the advantage of calomel in the treatment of *typhoid*. He gives it in the first week, not later than the eighth or the ninth day of the attack, and indeed at any time, should there be no diarrhoea. Calomel exhibited to induce a purgative effect, lowers the temperature for one or two days, and gives the patient a relatively quiet night or two. His rule consists in giving the calomel in grain doses hourly until twelve grains have been taken, after which, should it not purge, he prescribes castor oil. He rejects the theory of its action on the microbes of typhoid.

Sacharjin, during his first two years of practice, in treating croupous pneumonia, relied on digitalis, but finally became convinced of its inutility. He was equally disappointed in cold baths. Quinine to be effective in reducing the temperature must be administered in massive doses, and such quantity has a bad effect on the stomach and disorders the nervous system. The remedy which he has finally decided on is calomel, which he gives, as mentioned under the head of typhoid, except that in sthenic cases he begins its use with the onset of the disease. Very often he finds that the fall of temperature induced by the calomel determines the occurrence of the crisis.

Sacharjin finds that in *acute Bright's disease*, which develops idiopathically, without being induced by a previous infectious malady, even in those cases which occur in the puerperal state but are not due to puerperal infectious diseases, calomel given as already described has an excellent effect; a significant fall of temperature takes place, the renal pains subside and the urine increases in amount and improves in quality. If the temperature rises again, and the patient's strength permits, the calomel is given again.

In the various acute maladies for which Sacharjin prescribes calomel, the contraindications to its use are, besides the weakness of the patient, principally feebleness of the pulse and diarrhoea, especially if the stools are profuse and exhausting.

URETHAN: ITS PHYSIOLOGICAL ACTIONS, AND ANTAGONISM TO STRYCHNINE.

In an elaborate paper, which appeared in the *Bulletin Général de Thérapeutique*, for April 30, 1886, PROF. COZE, of Nancy, examines the action of the new hypnotic urethan. We give his conclusions:

Urethan is a carbamate of ethyl. Its solubility in water renders its administration easy. It has a decided hypnotic action, and in large doses determines complete muscular resolution and anæsthesia. It slows the pulse and lowers the temperature. It is free from local irritant action, and can be administered by subcutaneous injection. It does not coagulate the fluids of the body or derange nutrition. It is a functional antagonist of strychnine.

It is indicated in man in the case of convulsions in general, and especially in tetanus.

The experiments to determine the antagonism of urethan to strychnine were made on frogs, rabbits, guinea-pigs, and dogs, and were most striking in their results. Control experiments were not omitted. As respects the animals named, the antagonism was complete; it is not to be doubted that in man the same satisfactory results may be obtained. We can, therefore, unite with the author in urging on our surgical colleagues the use of this new medicament in tetanus.

TERPENE IN CHRONIC BRONCHITIS.

DR. RIEU, in the *Gaz. méd. de Strasbourg*, abstract in *Bull. Gén. de Thérap.*, April 30, 1886, gives the following conclusions from the clinical study of terpene as employed in chronic bronchitis:

Terpene is readily taken, as it is without odor or taste, and the dose, which is one or two grammes (fifteen to thirty grains) a day, has absolutely no injurious action. In bronchitis and bronchorrhœa, with abundant purulent expectoration, it greatly reduces the amount of matter brought up. The mucopurulent expectoration of phthisis is not affected by it. It is not superior to creasote, Venice turpentine, and other balsamic preparations of the same character. As it is so little offensive, we may conclude from the observations of Dr. Rieu that this is its chief merit compared with the other members of this group.

ACTION OF AMYL NITRITE.

L. SCHWEINBURG, in the *Centralblatt für die medicinischen Wissenschaften*, 1886, No. 1, p. 13, in a study of the effects of amyl nitrite, finds that there are differences in its action on the vessels, according to the period after administration and size of the dose. It is universally agreed that a fall in the blood-pressure is the result of the inhalation of this agent in animals. When the state of the vessels is examined by means of Basch's sphygmomanometer, Schweinburg has ascertained that just at the moment the characteristic symptoms—flushing of the face, a sense of heat, and rapid beating of the heart and carotids—are produced, the blood-pressure rises. When the full effect is reached, there is always a fall in the blood-pressure, whether a full dose or a rapid succession of small doses be given by inhalation. Small doses given for therapeutical purposes always cause a rapid rising of the blood-pressure—by which statement we suppose he means doses not sufficient to cause distinct physiological effects.

PHYSIOLOGICAL AND CLINICAL ACTION OF GRINDELIA ROBUSTA.

An immense number of articles having appeared, especially in the American medical press, on the subject of *grindelia robusta* and its effects in curing and alleviating asthma, bronchitis, etc., DR. VASIL DOBROKLOWSKI, Chief of Prof. Botkin's Clinic in St. Petersburg, who seems well acquainted with all that has been written about this drug, finding that previous writers had confined their attention chiefly to its clinical effects, determined to investigate its physiological action on warm and cold-blooded animals.

Having carried out an elaborate series of sixty-eight experiments on frogs, dogs, and rabbits, and having administered it in ten clinical cases, he has come to the following conclusions (*Vratch*, 1886, No. 2):

1. The chief effect of moderate doses of fluid extract of *grindelia robusta* on the heart and circulation, is to diminish the number of cardiac contractions and to raise the arterial pressure.

2. The diminution of the number of cardiac contractions in warm-blooded animals is due to stimulation of the inhibitory nervous apparatus of the heart, and especially of that part of it which is situated in the medulla oblongata.

3. The elevation of the blood-pressure is caused by contraction of the bloodvessels, which is due partly to direct action of the extract, and partly to its stimulating effect on the vasomotor centres of the spinal cord, the medulla, and the cerebrum.

4. It diminishes the irritability of the different vasomotor nerves of the heart and vessels, as also that of the motor nerves and voluntary muscles. It is found that the irritability of the central apparatus falls more readily—*i. e.*, more quickly and with smaller doses—than the peripheral, and that the irritability of the nerves is more readily lowered than that of the muscles.

5. The therapeutic effect of the fluid extract consists in diminishing and regulating the cardiac contractions. Its diuretic action is not of a strongly marked character.

6. Its regulating action on the nerves of the heart is greater than that of *digitalis*, *adonis vernalis*, *convallaria majalis*, and even than that of *chloral hydrate*. Its dirotic action is less than that of *digitalis* and *adonis vernalis*.

The author considers that in many heart cases in which other remedies have failed, a combination of *grindelia robusta* with *adonis vernalis* holds out a hope of success. The dose of the fluid extract given by him was thirty drops three or four times a day.

The foregoing observations of Dr. Dobroklowski are confirmatory of a physiological investigation made by the reviewer several years ago (*Bartholow's Mat. Med. and Therap.*, 5th ed., p. 609). He has not, however, referred in the paper from which the above abstract was made, to the pronounced cerebral effects of *grindelia*, more especially its hypnotic action. How far the changes in the intracranial circulation, due to the action of this agent on the vasomotor system, may be responsible, does not appear.

RESULTS OF ADMINISTRATION OF THALLIN, AND CAUTION AS TO ITS PHYSIOLOGICAL EFFECTS.

DR. KARST, of St. Petersburg, has made 202 observations on the effects of thallin, giving it in doses varying from $1\frac{1}{2}$ grains to 10 grains. A reduction of from 0° to 4° C. occurred in 122 of these; usually the reduction was between 1° and 3° C., but in 14 cases it was between 3° and 4° . The interval which elapsed between the administration of the drug and the maximum fall of temperature varied from 1 to 4 hours, but was most commonly 1 hour. The duration of the reduction was in a few cases, especially where large doses were given, as much as 5 or even 6 hours, but it usually varied from 1 to 4 hours, the most frequent time being 2 or 3 hours.

The complications observed were rigors (25), perspiration (98), nausea (2), and vomiting (12). The author found that a severe rigor could be arrested by thallin given at the time. In a very few cases there were slight reductions in the pulse and respirations. The urine was of a dark brown color in cases where large quantities of thallin were taken. The urea diminished during the administration of the drug, and after this was discontinued increased to about the same amount as before, but after the lapse of a few days became much more abundant, from which the author concludes that the diminution of urea during the administration is not due, as Maragliano suggested, to decreased oxidation at that time, but to the retention in the system of the effete and poisonous products of the decomposition of the tissues, which Dr. Karst thinks should induce us to use thallin with caution. A similar result has, he remarks, been obtained by Dr. Jacobowitsch in the case of antipyrin, and he himself is now making experiments with resorcin, naphthalin, antipyrin, quinine, carbolic acid, trichlorophenol, salicylic acid, and cold baths, with the object of elucidating this question.

We are indebted to Dr. Maxwell, of Woolwich Common, England, for these translations from the Russian.

SURGERY.

IN EUROPE.

UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,

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RECENT SURGICAL LITERATURE.

So many additions have been made to the literature of surgery during the past few months that the more notable only can be dealt with.

PROF. VERNEUIL has issued the fourth volume of his "*Mémoires de Chirurgie*" under the title of *Traumatisme et Complications* (Paris, 1886). The work forms a very bulky volume. The style is verbose and diffuse, and the matter ill-arranged. The book, however, contains a vast amount of valuable clinical material, and forms a very important contribution to modern surgery. The first part is occupied with an account of injuries of various kinds based upon a great mass of clinical data. Then follows a masterly paper by Dr. Manoury on traumatic fever. Next succeeds a monograph by Dr. Dunoyer on the influence of intercurrent maladies and conditions upon injury. This subject Prof. Verneuil has made peculiarly his own, and it is remarkable that his work has excited so little attention elsewhere. The greater part of the book—no less than 300 pages—is devoted to erysipelas. The clinical features of the disease form the main points of the discourse, and rare forms of erysipelas, such as the recurrent and the hemorrhagic, are most exhaustively dealt with.

Verhandlungen der Deutschen Gesellschaft für Chirurgie (Berlin, 1886). The last volume of the transactions of this Society will attract considerable attention. Many of the papers have been already reviewed. The more important communications are the following: Prof. Volkmann's paper on the surgical aspect of tuberculosis—a paper already well known; Braun on the treatment of intussusception; Sonnenburg on partial resection of the bladder; Wolff on the treatment of cleft-palate; Wolff and Bessell-Hagen on the treatment of club-foot; and Kraske on excision of rectal cancer.

PROF. HEINEKE'S work on operative surgery, *Compendium der chirurgischen Operationen, und Verbandslehre* (Erlangen, 1886), is at last completed. It forms a bulky volume of 920 pages, with 451 illustrations. The work is very disappointing. The ground covered is extensive, but the matter is by no means up to date. The operations with which the names of German surgeons are more particularly associated are well described, but the author appears loath to extend his efforts beyond the German school. Many chapters—such as that on plastic operations and the surgery of the stomach—are very good, but the account of the radical cure of hernia is practically useless and out of date. The same may be said of the more recent operations upon the bowel, of ovariectomy, and the operative procedures directed against the uterus. The illustrations are poor and sketchy.

Nouveaux Elements de Chirurgie Opératoire, by PROF. CHALOT (Paris, 1886). This book, published as one of the series of manuals issued by Doin, of Paris, is deserving of great praise. The work is small, is profusely illustrated, and is sold at the low price of eight francs. So many excellent works on operative surgery exist in the French language that nothing but the admirable character of this work could excuse its existence. It is intended mainly for students practising operations upon the dead body. The matter is well arranged, and the various subjects are discussed in concise and simple language. The book is well up to date, the most modern procedures are included, and the illustrations are among the best that we have seen. No recent book has covered so wide a ground in so small a space. None, with which we are acquainted, is more comprehensive. Indeed, it is not too much to say, that it is the most excellent manual on operative surgery, for its size, that has been lately issued.

La Thérapeutique Médico-chirurgicale en 1885 (Paris, 1886). This is the first issue of this work. It represents the annual volume of *Le Répertoire de Thérapeutique*, and professes to give an account of all that is new in the matter of treatment for all countries. The articles are 224 in number, are contributed by various authors, and the general plan of the book is similar to that of the English *Year Book of Treatment*. As may be supposed, the work of French surgeons and physicians preponderates. The book, however, provides an excellent and very well-selected summary. It contains a novelty in the form of a section for "professional questions, medical ethics, etc.," and also a series of special articles by well-known authors. The chief of these that are of surgical interest are the following: on double hydrocele, by Prof. Trelat; on orchitis, by Dr. Barette; on the surgical treatment of vesical tumors, by

Dr. Pousson; on cholecystotomy, by Dr. Cyr. The work concludes with a most convenient collection of new formulæ. The surgical element in the book is very well represented.

The seventh volume of the *Compendium Annuaire de Thérapeutique* (Paris, 1886) has also just appeared. It professes to deal with the chief medical and surgical work in all countries. The compilation is, however, very imperfect, the matter ill-arranged, and an overwhelming position given to the consideration of new drugs. The surgical sections are very poor.

Des Fractures Spontanées, by PAUL SIMON (Paris, 1886). This thesis gives a complete and elaborate account of spontaneous fractures. It deals first with spontaneous fractures due to muscular violence and with the question of physiological fragility in bone. The next section concerns pathological fractures, those due to epiphysitis and other bone diseases, to bone tumors, to syphilis, to osteomalacia, and some less notable conditions. The concluding chapter deals with dropsy of bone. There is little in the work that is original, but as an exhaustive and carefully prepared monograph upon these peculiar lesions the book will be received with pleasure. Compilations of this kind are of considerable value.

Coxo-tuberculose, by PROF. LANNELONGUE (Paris, 1886). All those who read Professor Lannelongue's work on cold and tubercular abscesses and on tuberculosis of bone, published some years ago, will be able to anticipate the character of this monograph upon hip-joint disease.

The book is a masterpiece, and may be commended to the notice of every surgeon who is interested in this common malady. The pathological section is full of original matter, the illustrations are excellent, and the general treatment of the subject exhaustive. The etiology of the disease, its clinical aspect, the details of its prognosis, diagnosis, and treatment, are all dealt with in a thorough and original manner. There is little doubt that the work will become well known.

La Scrofule, by DR. VAN MERRIS (Paris, 1886). This is a large work of some 650 pages. It deals almost exclusively with the subject of scrofula in reference to treatment by sea-bathing. It is a work of little or no value, and is not constructed upon scientific lines. It gives a good account of the various hospitals for the treatment of scrofula in England and America, and is crammed with statistical matter. The author proceeds to consider the treatment of every possible form of strumous disease by sea-bathing. The work is weak and one-sided.

Die Hygiene und Aesthetik des Menschlichen Fusses, by LUDWIG SHAFFER (Vienna, 1886), is a somewhat remarkable book. Its subject, the hygiene and "æsthetics" of the human foot. It enters fully into the mechanism of the foot and the subject of boots, and especially of military boots. The book will be read with interest by orthopædic surgeons, to whom it presents many valuable hints.

Le Mal Français à l'Époque de l'Expédition de Charles VIII. en Italie, by DR. HESNAUT (Paris, 1886). This little volume furnishes an account of syphilis

("the French disease") as it appeared at the period named—*i. e.*, about the end of the fifteenth century. It is a valuable contribution to the history of this disease and to the general history of medicine. The book is somewhat marred by long quotations from Latin documents. It is admirably printed and got up.

The first volume of the Transactions of the *Congrès Français de Chirurgie* has appeared (Paris, 1886). It represents the work of the first session of this important Society, and contains many papers of considerable value. Amongst the chief subjects discussed are the following: Tarsectomy in talipes varus; the etiology and pathology of infectious surgical disorders; the state of the urine in surgical maladies; cold abscess; the treatment of ruptured intestine.

Des Affections Rhumatismales du Tissu Cellulaire Sous-cutané, by DR. CHUFART (Paris, 1886). This monograph covers considerable ground, and concerns such diverse affections as the following: Rheumatic œdema, rheumatic nodes, lipoma, "secondary elephantiasis," Dupuytren's contraction, and scleroderma. All these affections the author regards as due to rheumatism. His conclusions will probably not meet with general approval, and in some respects may be considered to be a little extravagant. The book, however, is written with spirit and in an original manner, and opens up questions well worthy of investigation.

Ueber den Shock, by DR. GRÖENINGEN (Wiesbaden, 1885). This important treatise should have been noticed in a previous summary. It provides an admirable review of the whole subject of collapse. It deals with the physiology of shock, the various theories as to its production, its clinical aspects, diagnosis, and treatment. A work of this kind, as representing the present state of knowledge upon one important surgical condition, is of great value, and that value is enhanced by a very full bibliographical index.

Die Technik der Massage, by DR. REIBMAYR. A second edition of this valuable treatise has just been published in Vienna. Now that massage has assumed an emphatic and important position in surgical treatment, the need of a manual dealing with the modes of applying massage is evident. The present manual is the most complete that has been published upon the subject. It deals with all the manifold conditions under which massage may be of use, and the surgeon will be especially interested in the chapter on massage in chronic joint disease. The book is illustrated by 149 woodcuts.

Die Neurome, by DR. COURVOISIER (Basle, 1886), is a small but exhaustive work on all forms of neuromata. The author divides these growths into the following divisions: 1. Those that follow nerve division, including the neuromata of stumps. 2. The painful subcutaneous tubercle. 3. The neuromata of nerve trunks; and, 4. Those of nerve fibrils. Under each head the pathology, clinical aspect, and treatment are fully described, and the references to the literature of the subject are so complete that the monograph may be regarded as one of the most comprehensive of its kind.

Deutsche Chirurgie. The two volumes of this work just issued (Lief. 49 and Lief. 50) consist of *Milzbrand und Rauschbrand* (Splenic Fever and Septic Intoxication), by DR. KOCH, and DR. BREISKY's work on *Diseases of the Vagina*. These treatises are among the most important additions to recent surgical literature, and no higher praise can be given them than by saying that they maintain the character of this remarkable work.

Two volumes of the *Dictionnaire Encyclopédique des Sciences Médicales* (Paris, 1886) have lately appeared (April). The first runs from "Pel" to "Per," and contains two papers of surgical interest, one on "Pemphigus," by DR. CHAM-BARD; and one on the "Penis," by DRs. MONOD and BRUN. The latter article is the chief contribution in the volume. It deals with the anatomy, deformities, injuries, and diseases of the organ. It is a laborious production, and will be most valuable on account of the admirable chapter on the injuries of the penis.

The second volume runs from "Tar" to "Ten." The article of most note comes under the head of "Tendon," and is written by M. HÉNOQUE. Another paper—and a very remarkable one—is that on "Tatouage," by DRs. LACAS-SAQUE and MAGILOT. It is difficult to understand how 165 closely printed pages could be written upon tatooing, but without being unduly verbose the authors have produced a very interesting and in many respects extraordinary paper. The matter is illustrated by a number of curious woodcuts representing the artistic aspect of tatooing.

To this list may be added a new edition of MR. GANT'S well-known work, *A Manual of Surgery*, in treatises by various authors, in three volumes, edited by MR. TREVES; MR. HUTCHINSON'S "Lectures on Syphilis" (*British Medical Journal*, 1886, Nos. 1306, 1308, 1310); and MR. SUTTON'S "Lectures on Evolution in Pathology" (*British Medical Journal*, 1886, Nos. 1311, 1312, 1313).

The following *recent articles* are worthy of notice, although space will not permit of their detailed consideration:

On the Treatment of Intestinal Obstruction by Kussmaul's Method of Washing out the Stomach, by BARDELEBEN (*Berliner klin. Wochens.*, No. 25).

On Extirpation of the Kidney, by BERGMANN (*Ibid.*, Nos. 46–48).

Two Cases of Operation for Hydronephrosis in Children, by RUPPRECHT (*Ibid.*, No. 35).

On the Indications for Nephrectomy, by BRAUM (*Centralblatt für Chirurgie*, No. 14, April, 1886).

On Contusion and Inflammation as Local Predisposing Causes to Cancer, by M. NICAISE (*Revue de Chir.*, 1885, No. 9).

A Monograph on the Causes, Nature, and Treatment of Diphtheria, by DR. FRANCOTTE. Leipzig, 1886.

The Experimental Development of Tubercle in Bone, by DR. W. MURLER (*Central. für Chirur.*, No. 14, April, 1886).

On Tumors of the Bladder and their Treatment, by DR. KUSTER (*Samm- lung klin. Vorträge*, Nos. 267 and 268).

On the Operative Treatment of Facial Neuralgia, by DR. FOWLER (*Annals of Surgery*, April, 1886).

THE FATE OF PATHOGENOUS GERMS IN THE BODY.

DR. RIBBERT (*Deutsche med. Wochenschrift*, 31) opens up the question of the fate of certain injurious microorganisms after they have entered the body. The matter has, up to a certain stage, been investigated by Metschnikoff, and a slight account of this work was furnished by Mr. Sutton in his recent Lectures at the London College of Surgeons (*British Medical Journal*, Feb. 20, 1886). Ribbert shows that the infective microorganisms after they have entered the body can be destroyed when they are entirely surrounded by protoplasm, or when entirely enveloped by leucocytes. They are thus cut off from all means of obtaining nourishment, and are starved. The investigations mainly refer to certain diseases produced by the moulds *Aspergillus fumigatus* and *A. flavescens*. It is seen that the colonies of germs that are surrounded by leucocytes become wasted, indistinct, and altered in their capacity for staining. This mode of destruction does not apply to all infectious diseases. In splenic fever and in tuberculosis the cells of the organism do not appear to be powerful enough to put an end to the process. Ribbert also points out with what facility and in what great quantity infective germs may be evacuated by the kidney. He thinks that this is the chief mode of disposal in most infectious disorders. He points out, however, that the germs passing through the kidney may be arrested there, and may form a focus for a new invasion of the body.

NERVE SUTURING.

MR. REGINALD HARRISON (*British Medical Journal*, March 6, 1886) reports the following case: A man, aged twenty-one, received a severe cut across the front of the wrist. The ulnar and median nerves were divided. When seen, eighteen months afterward, all parts in the hand supplied by those nerves were paralyzed. The nerves were exposed, and their ends freshened and united by catgut. In the course of eighteen months the nerve supply of the parts was completely reestablished, and the patient had a useful limb, which, however, still showed a little impairment of motion and sensation.

In connection with this subject a valuable and exhaustive monograph has been recently published in Leyden, by DR. KOPPESCHAAR (*Nervennaht und Nervenneubildung*). The histology of nerve healing is well described, the literature of the subject amply given, and the paper illustrated by five very interesting cases. A good case of suturing of the musculo-spiral nerve is also given by HOFFMANN (*Deutsche med. Wochenschrift*, No. 27, 1885).

SURGICAL TREATMENT OF EMPYEMA.

DR. MACLAREN, of Carlisle, in the *British Medical Journal* for April 3, 1886, gives an account of the following operation: A lad, aged seventeen, developed left-sided pleurisy in May. In June seventy ounces of clear fluid were drawn off. In August ten ounces of pus were evacuated. In the following March, the punctures made were still discharging pus, and in July portions of the fifth, sixth, seventh, eighth, ninth, and tenth ribs were removed in segments varying in length from two and three-quarters inches to one inch. The cavity continued to discharge until June in the next year, when the patient is re-

ported as "quite well." The treatment, therefore, extended over three years. Dr. Maclaren concludes the paper with some valuable remarks upon the general treatment of empyema by surgical means.

COMPRESSION OF THE INNOMINATE ARTERY.

PROF. ANNANDALE, in the *Lancet* for March 13, 1886, considers this subject under two heads: 1. Temporary compression of the artery in connection with prevention of hemorrhage in operations or injuries involving its main branches. 2. More permanent compression of the same vessel in connection with the treatment of aneurisms involving the same branches.

1. For temporary compression he advocates the following method: An incision, two inches long, is made in the middle line of the neck just above the sternum. The trachea is exposed, and then, by a careful separation of the tissues, the posterior aspect of the artery can be exposed, and the vessel compressed against the sterno-clavicular articulation. The compression may be effected by the finger, or by a special clamp, one blade of which fixes the artery, while the other takes its hold upon the front of the sternum.

This method is the application to the innominate of the procedure adopted by Syme for other cervical vessels before dealing with aneurisms of the neck or axilla by the "old method."

2. Prof. Annandale's proposed method in a case of subclavian aneurism is this: 1. To expose the innominate artery by means of the incision just named under antiseptic precautions. 2. To insert one end of an India-rubber drainage tube under the artery, and leave it there in position until the tissues had become accustomed to its presence. 3. To introduce the small blade of the clamp described into the drainage tube and carry on more or less continuous compression. The measure is illustrated by one case only. The patient, a man aged fifty-three, was admitted with a subclavian aneurism. The incision was made, and the drainage tube inserted on May 27th. Before the second step in the procedure could be adopted the patient died (June 8th) of hemorrhage from the innominate artery.

ON RECTAL EXPLORATION IN CASES OF HIP DISEASE.

DR. SCHMITZ, of St. Petersburg, in *Centralblatt für Chirurgie* for March 13, 1886, points out that by examination through the rectum the pelvic aspect of the acetabulum may be fully explored. It is well known that coxitis often commences in the acetabulum, and probably not unfrequently in the Y-shaped cartilage in its floor. The diagnosis of the seat of the trouble may therefore be aided by the measure proposed. He gives the following cases: Male, aged three, symptoms of hip disease; gluteal abscess; prominence of third lumbar spine; rectal examination revealed a swelling in region of acetabulum; gluteal abscess opened; it led into hip-joint; acetabulum perforated. It is probable here that the trouble commenced in caries of the lumbar spine, and that the abscess resulting therefrom found its way into the hip-joint.

Male, aged five, Pott's disease of spine; hip disease; gluteal abscess; precisely the same perforation of the acetabulum with tumor felt *via* rectum as in previous case.

This also was probably a case of spinal abscess burrowing into the hip-joint. Male, aged five, hip disease twenty-one months; gluteal abscess, the size of a hen's egg, felt through the rectum; pain on defecation; perforation of the acetabulum discovered as in the other cases. Arthrectomy was performed in each instance, and a good recovery resulted.

ON THE TREATMENT OF HIP DISLOCATIONS COMPLICATED BY FRACTURE OF THE NECK OF THE FEMUR.

DR. WIPPERMANN, in *Archiv für klin. Chirurgie*, Bd. 32, p. 440, commences his observations with this case: A woman, aged thirty-four, was struck by a falling piece of timber, and fell to the ground. The result was a dislocation of the left femur. It was not treated. In fourteen days she began to walk with a crutch. In three months she came under the author's notice. She was very lame, and a dislocation onto the dorsum ilii was detected. In attempting reduction under chloroform, the neck of the femur was broken, but the luxation not reduced. In due course a gluteal abscess formed. This was opened, and the head of the femur, loose and necrosed, removed. The patient made a very fair recovery. Dr. Wippermann has collected no less than thirteen cases of dislocation at the hip-joint, associated with a fracture of the neck of the femur. In one-half of the cases the fracture was produced by the attempts made at reduction. These various cases are analyzed in detail. The results of this examination, so far as the treatment is concerned, are as follows: 1. If the fracture be due to the accident, and have followed upon the same lesion that produced the dislocation, attempts should be made to obtain union of the broken bone. 2. If the fracture be due to attempts at reduction, and be extracapsular, attempts should be made to obtain union. 3. If the fracture be due to attempts at reduction, and be intracapsular, the head of the femur should be resected, as it will, if left, necrose. The author does not discuss the propriety of establishing non-union in the fracture in order to provide freer movement about the hip.

ACUTE MYOSITIS.

PROF. SCRIBA, of Tafrau, in *Centralblatt für Chirurgie*, No. 8, 1886, has reported four cases of this peculiar affection. It consists of a multiple inflammation of striated muscle. The affected muscle becomes hard, tender, swollen, and useless. The symptoms develop suddenly, and in each case followed some slight suppurative trouble, either in the skin or the mucous membrane. The author believes that this affection is of the same character as acute osteomyelitis—*i. e.*, that it is a disease of an infective type, and that the micro-organisms are derived from the primary suppurative centre.

The prognosis is good. The inflammation usually subsides without complication—even when suppuration occurs healing readily takes place after the pus has been discharged.

ANEURISM OF THE ABDOMINAL AORTA.

DR. LIEBRECHT has produced a monograph on aortic aneurism (Liège, 1885), of some value. The work commences with an account of a case under

the care of Prof. Loretta, and concludes by a review of all the published records of ligature of the abdominal aorta. The following is Prof. Loretta's case: A sailor, aged thirty, who had had syphilis when twenty-five, received a strain in June, 1884. This was followed by abdominal pain. In three months the man was unable to walk, and soon took to his bed. A pulsating tumor was discovered in the abdomen about the points of origin of the celiac axis and superior mesenteric arteries. An incision was made from the xiphoid cartilage to the navel, and the tumor exposed with difficulty; it was the size of the head of a newly born child. Loretta introduced a canula into the sac, and through it inserted two metres of silvered copper wire, half a mm. in thickness; no bleeding followed, and the parietal wound was closed; a rapid improvement followed. In eighteen days the tumor was only one-third its original size. In four weeks it was one-fourth its size, and had ceased to pulsate. In seventy days the man was discharged cured. Ten days later he died suddenly, and the autopsy revealed a complete cure of the aneurism with a rupture of the aorta just below the obliterated sac. Loretta ascribes this rupture to atrophy of the vessel produced by the presence of the aneurism in conjunction with syphilitic disease of the aortic walls.

A NEW METHOD OF REDUCING HERNIA.

DR. NIKOLAUS, in *Centralblatt für Chirurgie* for Feb. 6, 1886, proposes the following method in place of taxis: He points out that in reducing a strangulated or incarcerated hernia the end can be much more readily obtained by traction from within the abdomen than by pressure applied without that cavity. He cites cases where taxis had failed during life, but where after death the gut was readily reduced by dragging upon it after the abdomen had been opened. He draws attention to the frequent failure of taxis, and supports his arguments with reference to traction upon a series of experiments with gut held in an artificial opening. After reviewing the various plans of reduction by posture, he advises that the patient be placed in the knee and shoulder position. Both knees rest upon the bed, the femora are kept in the vertical posture, and the shoulder of the sound side is supported also upon the couch. Before this posture is assumed the bladder and rectum may be emptied, and while it is maintained gentle pressure may be kept up on the swelling. The position may be persevered in for twenty or forty minutes, or longer. Dr. Nikolaus maintains that it relieves the circulation in the strangulated part, that it reduces the intra-abdominal pressure, and causes the weight of the mass of intestines to act by traction upon the segment of gut retained.

He gives cases to show that this method has succeeded after taxis under chloroform has failed. The procedure is certainly more reasonable than that by taxis, and is worthy of extended trial. The author thinks that it is of no use in cases of internal strangulation.

FLAT-FOOT.

PROF. HUMPHRY has contributed an interesting paper upon this subject (*Lancet*, March 20, 1886). The article deals so entirely with matters of detail, that an abstract that would be of any value is scarcely possible. The author commences with an account of the mechanism of the foot and the construc-

tion of the plantar arch. This account represents that usually accepted at the present day, but Prof. Humphry has added many points to the elucidation of the subject, and the demonstration is very clear. Then follows a description of a recently dissected case of flat-foot, which description is without doubt the best that we possess.

The article should be read in conjunction with Mr. Symington's paper on "Flat-foot" in the nineteenth number of the *Journal of Anatomy*.

An elaborate contribution on "Flat-foot and Club-foot" (*Beiträge zur Lehre vom Klumpfusse und vom Plattfusse*) has also been recently published in Berlin by Dr. Roser, of Marburg.

DRAINAGE OF THE BLADDER.

MR. HOWLETT, in the *British Medical Journal* for February, 1886, advocates continuous drainage of the bladder in the following conditions (among others): chronic cystitis, enlarged prostate, atony of the bladder, paralytic retention, ruptured urethra, impassable stricture, malignant disease of the prostate or bladder, and as a preparation for plastic operations upon the urethra. He then reviews the various methods by which such drainage could be carried out and discusses the suprapubic, rectal, prostatic, and interpubic puncture, and the opening of the membranous urethra. He points out the objections that may be urged against these procedures, and claims an advantage for his own operation which he terms the postprostatic. To perform the operation, the patient is placed in the lithotomy position, and the forefinger of the left hand is passed into the rectum until the region of the trigone is reached. A trocar and canula of the size of a No. 12 catheter is thrust through the skin about three-quarters of an inch in front of the anus and slowly pushed on until resistance is felt to have disappeared. The bladder is then emptied and a suitable tube fixed *in situ*. The following appear to be the risks of the proceeding: urinary extravasation behind the deep pelvic fascia, injury to the vesiculæ seminales or to the peritoneum. Mr. Howlett records two cases, in both of which the operation was followed by satisfactory results.

ON THE CAUSE OF HYPERTROPHY OF THE PROSTATE.

MR. REGINALD HARRISON has contributed an important paper upon this subject (*Lancet*, March 6, 1886). The points upon which the author lays special stress are these. The interureteral bar of muscular fibres is very usually met with in cases of enlarged prostate, and is obviously the result of muscular hypertrophy. A depression of the trigone may exist previously to the prostatic enlargement, and a condition of residual urine may precede rather than result from the increase of the gland. The trigone, or floor of the bladder, is peculiar in that it contains but few muscular fibres. Muscle in abundance may be found in the bladder as low as a line corresponding with the openings of the ureters and marking the superior boundary of the trigone, and again abundance is found below in the prostate. Between these two points the power of muscular contraction can hardly be said to exist. Assuming that, from any cause, such as a long retention of urine, habit, position of the body, or the weakness connected with advancing years, the trigone or non-contractile part of the bladder becomes permanently depressed or

altered in form, so that the person finds himself unable to get rid of the last half ounce or so of urine; the effect will be frequently repeated expulsive efforts in all the muscles immediately adjacent to a part which, by reason of its connections and structure, has no power of exercising contractibility. Mr. Harrison believes that this will eventually lead to hypertrophy of the muscular fibres between the orifices of the ureters—the interureteral bar—as well as of the muscular fibre that enters so largely into the structure of the prostate. Mr. Harrison supports his view by reference to clinical data and to the behavior of the prostate after such operations as have rendered the act of micturition purely mechanical. The author fails, we think, to show how the prostate, situate as it is below the depressed trigone, can empty the bladder of urine that is lodged above it, and why the hypertrophy of the bladder should attack especially the interureteral tissue. The paper is, however, most suggestive, and as the work of the chief authority in England upon the subject, it demands attention.

TUBERCULAR DISEASE OF THE GENITO-URINARY ORGANS IN THE MALE.

The points raised by DR. STEINTHAL (Virchow's *Archiv*, Bd. c. p. 81) in a paper upon this subject are these. In cases of extensive tubercular disease of the urinary passages does the trouble spread downward from the kidney, or does it commence in the urethra and spread upward through the bladder and ureters to the renal pelvis? And, secondly, what part does tubercular disease of the testis play in connection with this matter?

Dr. Steintal's answers to these questions are based upon the data of twenty-four cases. He thinks that in extensive disease the trouble usually commences in the kidney and spreads downward, and that spreading in an ascending direction is quite uncommon. He believes tuberculosis of the testis to be usually the outcome of a solitary deposit, and to be, with very few exceptions, primary. It is to be noticed also that tubercular mischief spreading from the kidney will follow the urinary passage and will not advance to the testicle.

OPERATIONS ON THE STOMACH.

DR. HACHER has published an account of the circumstances and the fate of the patients subjected to operations on the stomach in Professor Billroth's clinic from 1880 to March, 1885. (Vienna, 1886.) Thirty-three operations were performed, with thirteen recoveries and twenty deaths.

1. Gastrotomy. One case (recovery) for the removal of false teeth that had been swallowed. The indications for gastrotomy are given and the details of the operation are fully described. Gastrotomy in connection with Loretta's operation is also considered.

2. Gastrorrhaphy (the operation for the closure of openings in the stomach). Two cases are given: one of perforation of the stomach, and one of penetrating wound from a revolver bullet. Both were fatal. This operation would appear to have no prospect of success unless performed very early.

3. Gastrostomy. Four cases: three for cancer of the gullet, and one for cicatricial stricture of that part. The latter patient recovered. The others died, although one of them lived for one and a half months. Billroth is not

greatly in favor of this operation in cases of cancer. He thinks it should be performed for the purpose merely of prolonging life, and should not be undertaken until the swallowing of fluids has become quite impossible.

4. Gastrectomy (the operation for the removal of portions of the stomach, pylorotomy). Eighteen cases are given, with ten deaths. Fifteen of these patients were the subjects of pyloric cancer, and of this number eight died. They are placed in three very convenient classes. No. 1. Cases where no adhesions existed and the glands were free. Two patients came in this division. Both recovered, and were alive respectively two and four years after the operation. No. 2. Cases where slight adhesions had formed, and where a moderate gland implication was noted, eight patients. Five only survived the operation, and these died at periods of four months (two), of eight and a half months, of ten months, and a year. In two of these, gastroenterostomy had been performed. No. 3. Cases where extensive adhesions were found, and where metastases existed. Five patients came under this division. They all died very soon after the operation.

5. Gastroenterostomy (the operation of establishing a fistula between the stomach and jejunum in cases of pyloric cancer). Nine operations were performed. Five of the patients died from the operation; four survived, and died at the end of two months (two cases), four months, and one year. In the two last mentioned cases, gastrectomy had been performed.

The paper gives a full account of the technique of the various procedures, and forms a complete treatise upon the subject of gastric surgery.

ON THE TREATMENT OF PERITONITIS BY LAPAROTOMY.

This mode of treatment has now become very generally applied, and has been attended with considerable success. The following recent papers are the more important: PROFESSOR STUDENSKY (*Centralbl. f. Chirurgie*, No. 10, 1886). A girl, aged twelve, developed a purulent effusion in the peritoneal cavity on the nineteenth day of typhoid fever. She was emaciated; the abdomen was much swollen and very painful. By aspiration, six pounds of pus were removed without benefit. Four days after, laparotomy was performed, and six pounds of pus again evacuated. The peritoneal cavity was washed out with a four per cent. boroglyceride solution, and drained. Recovery was retarded by an encysted collection, which in time discharged, and the patient left her bed in three and a half months.

DR. NAUMANN (*Centralbl. f. Chirurgie*, No. 2, 1886) records four cases of diffused tubercular peritonitis treated by laparotomy. The patients were women, varying in age from twenty-three to fifty-six. One case was of doubtful character. It was a localized peritoneal collection of some kind, but its tubercular character was not established. The patient recovered rapidly after the laparotomy. In the three remaining cases there is no doubt that the trouble was due to tubercular disease of the peritoneum. The peritonitis was of slow progress, and attended with emaciation and considerable ascites. One patient had already phthisis. Of these three laparotomies, one only ended in recovery.

M. CHAVASSE (*Bull. et mém. de la Soc. de Chir.*, Paris, t. xi. p. 123). A man aged twenty-three received two kicks upon the abdomen from a horse. He

commenced to vomit two hours afterward, and on the third day acute general peritonitis set in. Laparotomy was at once performed, but the patient died. The autopsy revealed two contusions of the transverse colon, rupture of one of the mesocolic arteries, hemorrhage into the pancreas, but no perforation or extravasation.

DR. VALERANI (*Gazz. delle cliniche*, Nov. 24, 1885). A woman aged thirty-three came under treatment for chronic general peritonitis, following parametritis. She suffered from constipation, vomiting, and abdominal pain. The abdomen was distended, and there was much ascites. The pelvis appeared to be entirely occupied by a resistant swelling. Laparotomy was performed. The pelvic mass proved to be composed of an extraordinary fibrinous exudation. It was as firm as gelatine, and readily gave way under the fingers. A like collection occupied all the lower part of the abdomen. This material was taken away, so far as was possible. The abdominal cavity was washed out with a boracic solution and drained. The patient made a rapid recovery.

DR. J. MIKULICZ has published a valuable paper (*Sammlung klin. Vorträge*, No. 262) on laparotomy in perforations of the stomach and bowels. He includes not only his own cases that have been already published, but all other recorded cases up to the present time. He deals with the difficulties of diagnosis and the questions affecting early operation. The paper includes the question of laparotomy in gunshot wounds, in typhoid ulceration, in gangrenous hernia, and in typhlitis; the author is opposed to any interference in tubercular peritonitis. The details of the operation are fully described.

IN AMERICA.

UNDER THE CHARGE OF

R. J. HALL, M.D.,
OF NEW YORK.

TRACHEOTOMY FOR PSEUDO-MEMBRANOUS LARYNGITIS.

In the *Medical Record* of April 3, 1886, DR. ROBERT W. LOVETT gives an analysis of seventy-seven cases of tracheotomy for pseudo-membranous laryngitis, performed at the Boston City Hospital during 1885. The ages of the children varied from nine months to seven years. Twenty recovered, twenty-five died with septic symptoms, twenty-six with symptoms of extension of the membrane to the trachea and bronchi, four of heart failure during or after operation, and one each of pneumonia and peritonitis. The percentage of recoveries does not differ materially from the well-known thirty per cent. calculated from thousands of cases.

Besides a number of other interesting clinical observations, the special value of the report lies in the statement that in the twenty-six cases dying by extension, death was preceded by frightful and gradually increasing dyspnœa, far more prolonged and painful than in the cases where tracheotomy was not performed. In these cases, therefore, the operation was not a means of euthanasia, but the contrary.

INTUBATION OF THE LARYNX IN FIFTEEN CASES OF DIPHThERITIC CROUP.

Three cases are reported in the *Medical Record*, April 10, 1886, by DR. DILLON BROWN, Resident Physician of the New York Foundling Asylum, to illustrate the value of the tubes devised by Dr. James O'Dwyer, to be introduced into the larynx as a substitute for tracheotomy. The results, as regards relief of dyspnoea, seem to have been more satisfactory than in the cases of tracheotomy reported above, and if the introduction and retention are really as easy as claimed, the method may largely supplant the cutting operation in this class of cases. The whole tube lies in the larynx and trachea; the lower extremity extends to a point about half an inch above the bifurcation of the trachea, while the upper end rests upon the "ventricular bands."

LAPAROTOMY IN THE TREATMENT OF PENETRATING WOUNDS AND VISCERAL INJURIES OF THE ABDOMEN.

PROFESSOR F. S. DENNIS read an article on this subject before the New York County Medical Association (*The Medical News*, February 27 and March 6, 1886), which is undoubtedly destined to give a great impulse to the practice of early operative interference in this class of cases.

The injuries are divided into three classes :

1. Penetrating stab wounds.
2. Penetrating gunshot wounds.
3. Rupture of the intestine.

Under the first heading, a number of instructive cases are given, illustrating the benefits of operation, or the dangers of delay. In one of these, where wound of the intestine was suspected, laparotomy was performed, the whole abdominal contents carefully examined, and no wound being found, they were replaced, and the abdomen closed, the patient making a good recovery.

While almost all surgeons will agree with Prof. Dennis as to the propriety, or, indeed, the imperative necessity for immediate laparotomy in cases where there is even a strong presumption that the intestinal canal has been perforated, there will be much hesitation in accepting his advice to explore in all cases of penetrating wounds of the abdomen. Prof. Dennis unquestionably very much underrates the dangers of such an operation.

As Dr. Weir remarked, during the discussion at the New York Surgical Society, on Dr. Bull's successful case of laparotomy for bullet-wound, it is quite unjustifiable to compare the operation of exploratory incision for abdominal tumors with the same operation for suspected perforation of the bowel. In the former, a small incision, and the introduction of two or three fingers for a few seconds by the operator, usually suffice. In the latter, the abdomen must be widely opened, its whole contents inspected, and often the entire length of the alimentary canal passed through the hands of the operator. A case, indeed, is said to have occurred in the city, in the hands of a competent surgeon, where a similar operation was performed, no injury of the viscera being found, but the patient died of peritonitis. It is to be remembered, also, that in such cases the surgeon has to bear all the odium of having directly caused the death of the patient by an unnecessary operation.

Case VI. is one of extreme surgical and pathological interest. A penetrating wound of the abdomen, without wound of the intestine, was followed by a volvulus, causing strangulation fatal in about forty-eight hours. The volvulus is attributed to the sudden violent peristalsis, and, Prof. Dennis thinks, may be a not very rare occurrence.

In the *résumé* of successful cases of penetrating stab wounds, "where either a true laparotomy was performed, or the original wound was enlarged, the perforations sutured, and the cavity sponged," it is perhaps unfortunate that these two very different sets of cases should be put together, as it might readily convey a too favorable impression of the results in the operation really under consideration—that of laparotomy. Thus if we examine Prof. Dennis's four successful cases, only one is a true laparotomy, and no wound of the bowel was found; one is a wound of the abdomen, with protrusion of intestine, and two wounds of the protruded parts—suture of the wounds, enlargement of abdominal wound, and return of the bowel; the third case is a mere protrusion of the intestine without wound; and the fourth appears to have been omitted from the report; while the two cases of laparotomy for stab wound both died. Two cases of laparotomy for gunshot wound also terminated fatally, from hemorrhage.

The most valuable part of the article is, undoubtedly, that on rupture of the intestine due to traumatism; the diagnostic symptoms are well discussed and merit careful study. In the description of the technique of the operation we miss any discussion of the propriety of draining an infected peritoneum, instead of relying on the generally unsuccessful attempt at disinfection by antiseptic solutions.

PERMANENT DRAINAGE IN ASCITES.

DR. AUG. G. CAILLÉ read a paper on this subject before the New York Academy of Medicine (*The Medical News*, February 13, 1886). Two cases were related in full: the first patient, an elderly man, suffering from cirrhosis of the liver, had already been tapped nine times. Instead of merely resorting to another tapping, Dr. Caillé inserted a short drainage tube through an incision below the umbilicus, and applied antiseptic dressings as required. At first two to three pints of fluid were evacuated daily, but the quantity gradually diminished, and finally the discharge ceased altogether. The general oedema and other distressing symptoms disappeared entirely. No bad results followed the operation, except an eczema, due to the constant moisture, and readily overcome by protecting the skin. The patient was enabled to go about attending to his usual occupations for nine months, and entirely comfortable. He died finally of heart failure, the ascites and general anasarca not having returned. On post-mortem, cirrhosis of the liver was found, and there was no evidence of peritonitis at the point where the tube had been inserted.

The second case, also one of cirrhosis of the liver, and in a very bad condition before operation, was also completely relieved, and lived in comfort for a considerable time, dying finally of heart failure. No autopsy was obtained. Dr. Caillé then discussed the symptoms most troublesome and dangerous in ascites: the collateral circulation in cirrhosis of the liver; the ways in which relief of abdominal pressure might be expected to act benefi-

cially, and the best means of accomplishing this, giving a number of suggestions as to technique, and recommending strict antiseptic precautions, though stating that the peritoneum under such circumstances is well known to be less susceptible to infection than in the normal condition.

During the discussion which followed, Dr. JACOBI narrated two additional cases. In one, laparotomy was performed for supposed ovarian cyst, and only ascites found. A drainage tube was inserted and left in place for six weeks, giving entire relief, which, however, was only temporary, as the ascites returned. The second case was one of cirrhosis of the liver, and the operation was performed after hearing of Dr. Caillé's method. Some improvement followed, but the patient finally died of exhaustion. Dr. Jacobi also called attention to the fact that great relief is not infrequently afforded by the formation of a spontaneous fistula.

In these days of activity in abdominal surgery, it is safe to say that Dr. Caillé's suggestion will be eagerly adopted and thoroughly tested. It would be premature to attempt a final judgment until a much larger number of cases is at our disposal; but that the operation may not fall into undeserved disrepute through a failure to realize irrational expectations, it will be well to remember that results such as Dr. Caillé's can only be expected where the circulation through the liver can be partially reëstablished, or a considerable collateral circulation exists; and that, in regard to the extent of the possible collateral circulation, very wide differences exist between individuals. Further, we must remember that, although the peritoneum in ascites does not readily become inflamed, yet general peritonitis after mere puncture is not very rare, and that it is difficult, or often even impossible, to maintain an aseptic condition when the dressings are constantly soaked through by an albuminous fluid.

ON SPONTANEOUS PHLEBACTERIEKTASIA OF THE FOOT.

In *The Medical News* for March 20, 1886, Dr. A. G. GERSTER, reports two cases of this very rare condition, seen in the German Hospital, N. Y. The patients were boys, aged fourteen and eighteen respectively, and the disease dated from infancy in each. The older patient declined operation, and was lost sight of. The other presented a doughy, soft, nodular swelling, of irregular and not well-defined outline, on the dorsum and sole of the left foot, and in the dorsum of the foot along the course of the saphenous nerve a series of roundish, irregular, rather hard, dark blue, partly confluent nodes, surrounded by enlarged veins. There was an arterial bruit and pulsation over the tumor; the foot was generally hypertrophied, and had a higher temperature than the right; on its dorsum were a number of intractable ulcers. No other abnormalities existed, except unusually strong pulsation of both femorals, and enlargement of the heart, with increased energy of the heart-beat.

Amputation being refused, and elastic pressure having failed, the superficial femoral was tied in Scarpa's triangle, and ten minutes later, pulsation having returned, a ligature was applied to the external iliac. Pulsation ceased, but for some time the nutrition of the limb was very poor, and the belly of the peroneus longus and two toes actually became gangrenous, and were removed. Six months later the patient returned, pulsation being as

marked as before, and the foot in bad condition. A successful Pirogoff's amputation removed the diseased parts.

A reference is given to the very few previously reported cases.

Considering the very discouraging results in the cure of cirroid arterial tumors by ligature of main vessels, and the great danger of gangrene from the application of a second ligature at a higher point, after the ligature of a large trunk, we may very well question the advisability of the first operation, especially as there was no special urgency to justify so great a risk.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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A NEW OPERATION FOR CONGENITAL PTOSIS AND PARALYTIC PTOSIS.

PANAS begins his paper in the *Arch. d'Ophthal.*, for January and February, 1886, by a description of the objects which an operation is desired to produce. In all operations the shape of the lid is to be considered, which will result from the operation. As in these cases the levator muscle is absent or paralyzed, it must be replaced by that muscle which is its physiological aid—the occipito-frontalis, as without this substitution the lid, rendered shorter and even corrected in its form, would be inert and unable to be lifted voluntarily as in the normal state. Hence the necessity of effecting a close union between the movable part of the lid and the free end of the frontal muscle.

Panas's method of operating is as follows: The lid is put upon the stretch over a broad horn spatula, while an assistant presses his hand upon the forehead, so as to fix the tissues firmly against the bone and prevent their being pulled downward by the operator. The surgeon then makes a horizontal curved incision, with the concavity downward, from one commissure to the other, but interrupted in the centre for a distance of eight millimetres. This incision follows the upper border of the tarsus, which corresponds to the region where the tendon of the levator blends with the suspensory ligament. From the internal end of the outer incision and the external end of the inner incision, run two vertical and parallel incisions upward to the groove separating the lid from the eyebrow. Another horizontal incision, two centimetres long with the concavity downward, unites these two vertical incisions, and should extend through all the soft parts as far as the periosteum of the orbital margin. The small median flap is then dissected from above downward, as well as its ciliary base, passing between the orbicular muscle and the tarsus, care being taken to avoid the suspensory ligament of the lid. Finally a curved incision, parallel to the preceding, is then made just above the eyebrow, and three centimetres long, through the skin and supraciliary muscle down to the periosteum. The

musculo-cutaneous bridge comprised between these last two incisions is then carefully dissected up, avoiding the suspensory ligament of the lids and the frontal periosteum. It is then drawn downward, and the lid is slipped under it until the bleeding flap is brought in contact with that of the skin of the frontal bone and divided frontal muscle, and here it is fixed by three sutures. As the traction here exerted might produce ectropion of the lid, two other lateral sutures are introduced, which include the suspensory ligament and the conjunctiva, but exclude the skin and are fixed in the superior lip of the supraciliary incision. The lid is thus lifted directly upward, while the shape of the palpebral aperture is not altered. The sutures may be removed on the fifth or sixth day, but the bandage should be retained until the scar has become firm. At the end of six weeks the ptosis is permanently corrected.

THE ARTIFICIAL CORNEA.

MARTIN, in the *Recueil d'Ophthalm.*, for February, 1886, proposes a modification of the operation which has for its object the insertion of an artificial cornea. He proposes to rotate the eyeball on its antero-posterior axis a quarter of a circle inward toward the internal canthus. He advances the insertion of the internal rectus muscle as far as the corneal margin, thus producing a convergent squint. The leucoma of the cornea is thus turned inward, and the sclerotic forms the field for operation. Two weeks later he introduces beneath the conjunctiva, in the horizontal plane of the eye, and about six millimetres from the cornea, a small gold, semi-cylindrical nail with large head and pierced by an opening eight-tenths of a millimetre in diameter. When the eye has become accustomed to the instrument, eight or ten days afterward, he removes the obturator of the cylinder, and light at once enters the cavity of the eye. The conjunctiva is the obturating membrane, and this he removes by means of the galvanocautery.

SYMPATHETIC KERATITIS FOLLOWING DESTRUCTION OF AN EYE FROM INJURY.

ROLLAND, in the *Recueil d'Ophthalm.*, for March, 1886, reports a case of this kind occurring in a man aged fifty-four, who was suffering from an intense panophthalmitis of the right eye, following an injury from a piece of steel. Enucleation was proposed, but the patient refused, and would only allow Rolland to make a free incision into the inflamed eyeball. For five years the patient complained constantly of severe pain in the stump, but without any signs of sympathetic trouble. Five years and eight months after the accident the patient was brought to Rolland with a still painful stump on the right side and only quantitative perception of light in the left eye. The entire cornea was infiltrated, and in the inferior temporal quadrant there was a small ulceration. Photophobia, lachrymation, and marked conjunctival injection were present, and there was some pain. The stump of the right eye was at once removed, and ten days later the cornea of the left eye had entirely regained its transparency, and the ulcer had completely healed without any treatment to this eye. Vision was restored to the normal standard.

A CASE OF SYMPATHETIC INFLAMMATION CURED WITHOUT ENUCLEATION OF THE FELLOW EYE.

HOFFMANN (*Kl. mon. für Augenhelk.*, April, 1886) reports an interesting case of this kind following an extraction of cataract. The extraction was a perfectly normal operation, without any prolapse of the iris. Four or five weeks later, when there were traces of cortex still visible, a serous iridocyclitis developed, which lasted for some weeks and ended in closure of the coloboma iridis by a membranous exudation. Seven months after the extraction, when the eye had become perfectly quiet, an attempt was made to make a new pupil, which was followed by sympathetic inflammation of the other eye in the form of a serous iridocyclitis, while the eye on which the operation had been done remained perfectly quiet. The inflammation subsequently changed its character and became a severe type of exudative cyclitis, with periods of retrogression and exacerbation, which, however, finally ended under the ordinary application of heat, atropia, and small doses of quinine, and eventually an iridectomy upward. Eighteen months later, an extraction of cataract was made on this eye by Sattler, with a relatively excellent result.

THE ETIOLOGY OF GLAUCOMA.

SCHÖEN has of late years observed (*Arch. f. Ophthal.*, xxxi. 4) that the cases of acute glaucoma which came to him for operation, were all either hypermetropic, or were patients with hypermetropic astigmatism, and that when only one eye of a patient was the seat of glaucoma, it was the more hypermetropic of the two. These facts led him to think that both simple and acute glaucoma might be regarded as diseases of the accommodation. He raises for consideration the following questions: 1. Can the fibres of the ciliary muscle through their tendons exert any mechanical strain upon the prolongation of the sheath? 2. Can a mechanical distortion of the prolongation of the sheath be transmitted through the medium of the laminated fibres to the fibres of the optic nerve and the intervening tissues?

Careful investigations have shown him that there is developed in eyes which have been long subjected to great accommodative strain, a more or less pronounced excavation of the optic disk, which is called accommodative. The ciliary muscle may through its tendon exert a strain upon the prolongation of its sheath, and this strain is transmitted to the interior of the optic nerve. This accommodative excavation may be the first stage of simple glaucoma. Further investigations have shown that the action of the ciliary muscle results in an increase in the vitreous tension within the external zonula ring. In the anterior chamber the act of accommodation diminishes this tension. The lens, pushed forward by the increased pressure in the vitreous, must in some way be held back, or the tension in the anterior chamber would be increased, but of this there is no demonstrable proof. Hence, the factor which holds the lens back must be sought in the lens itself, and must depend upon an increased tension of the external leaf or lamina of the zonula. Microscopical examinations have convinced Schœn that the ciliary body and processes have imposed upon them the task of holding back the lens, and he assumes that the anterior leaf of the zonula has a concave curvature forward. He assumes that the inflammatory adhesion of the iris to the anterior surface of the ciliary

body and to the cornea, met with in glaucoma, is a secondary process, and the pressing forward of the lens is apparently the cause of these changes.

Schœn presents his theory of the causation of acute glaucoma as follows: The etiological factor of the acute glaucomatous process lies in a functional relative insufficiency of the circular fibres and of the inner and middle meridional fibres—that is, of all those fibres which hinder the advancement of the lens and diminish the size of the external zonula ring. If these fibres are not sufficient, the ciliary processes cannot hold back the lens by means of the anterior leaf of the zonule; the lens pressed forward by the vitreous pressure, increased by each act of accommodation, pulls the ciliary process forward. The anterior surface of the ciliary body rotates round a fixed point in the region of Schlemm's canal. Through the medium of the external leaf of the zonule and the ciliary processes, the lens, pressing forward, pushes the root of the iris around against the ciliary body and the choroid. The excretory channels are closed, and the secondary increased tension begins. Schœn's conclusions are as follows: 1. All primary forms of glaucoma are due to excessive strain of the accommodation. 2. The mode of action of this cause is a double one; a strain on the sheath of the optic nerve and a pressing forward of the lens. The first leads to excavation, the second to increased tension. 3. So long as the fibres of the ciliary muscle do their duty, the result is merely an accommodative excavation, or glaucoma simplex without increased tension. If, however, the inner fibres of the ciliary muscle are weak, the lens presses forward, and glaucoma, with increased tension, begins. 4. Both methods of action may occur together in various ways. An accommodative excavation may become a pressure excavation, as soon as the tension is abnormally increased. 5. The pathological changes seen in the ciliary muscle are but the consequence of the gradually developing inflammation, which has obscured the preliminary changes. In the first stage of glaucoma the only change would be a degeneration of the above-mentioned muscular fibres.

PARTIAL EMBOLISM OF THE INFERIOR DIVISION OF THE CENTRAL RETINAL ARTERY ASSOCIATED WITH REPEATED PREVIOUS ATTACKS OF CHOREA.

BENSON, in *Ophth. Review* for January, 1886, reports the case of a house-painter, aged twenty-one, who, on the previous evening while reading, noticed the sight of the right eye rapidly fail, until within a few seconds he became totally blind in that eye. In about three minutes the sight began to clear from below upward, and gradually improved, till in about fifteen minutes the field of vision reached the horizontal line, where it ceased abruptly, and has since remained. The perimetric examination showed absolute loss of the upper half of the field. He had been subject to left hemichorea for some years. R. E. V. = $\frac{6}{\text{XVIII}}$ with — D. 6, tension normal; L. E. V. = $\frac{6}{\text{VI}}$ with — D. 7, tension normal. Upper half of disk normal, with myopic crescent and deep physiological cupping. Lower half of disk hazy and whitish; lower half of retina œdematous, and whitish-gray in color. The macula showed the typical "cherry-red spot," surrounded by a distinct halo. Upper half of retina exhibited the "shot silk" appearance. There were no attenuated or empty vessels, and no hemorrhages. There was total loss of light-sensation in the lower half of the retina. The retinal œdema disappeared in a few days. One

small flame-shaped hemorrhage appeared at the lower outer margin of disk, but it was soon absorbed. The vessels began to diminish in size and to show the appearances of thickened coats. In about a month the vessels were markedly diminished in size, and a number of bright yellow spots, which had appeared near the macule, were absorbed. Vision remained unchanged.

In this case the sudden and total blindness of one eye, followed by the recovery in a few minutes of half the field of vision, and permanent loss of the other half, would seem to imply that the embolus, in the first instance, blocked the central artery at or before its bifurcation, and was dislodged from that situation, and washed into the inferior division of the vessel before any permanent injury was done to the retina. The early reëstablishment of the circulation in the lower half of the retina, without the restoration of vision, and the subsequent contraction of the vessels and atrophy of the retina, may be explained by assuming that an embolus of irregular shape only partially filled the lumen of the branch into which it drifted. The spasmodic contraction of the arteries, aided by the intraocular pressure, were at first sufficient to complete the arrest of the circulation produced by the partial embolus; but the spasm passing off in a few minutes, permitted the blood to flow slowly through the vessels, which were thus again filled, but at a lower tension than the normal. This patient had had an attack of acute rheumatic fever, and had suffered from left hemichorea, but there was no cardiac lesion demonstrated.

ON CHANGES IN THE FUNDUS OF THE EYE IN SEPSIS.

BOYER (*Arch. of Ophthalm.*, xv. 1) gives the results of his examinations of eyes of women suffering from puerperal fever and of lying-in women not septically diseased, as follows: 1. Retinitis septica, composed of hemorrhages and the so-called *Roth spots*, is only pathognomonic of sepsis, where all other diseased conditions which may give rise to similar changes are eliminated. In typhus this affection of the eye has never been observed. It appears as well in the phlebitic as in the lymphangitic form of puerperal fever. 2. In ordinary panophthalmitis there is always suppurative choroiditis, although it may not originate in the choroid. He distinguishes between (1) suppurative choroiditis, which, if not traumatic, proves the existence of a septic disease, and in many cases ulcerative endocarditis; and (2) suppurative retinitis, which affects the choroid secondarily, and thus leads to the ordinary panophthalmitis. It begins as an embolic inflammation of the retina, leads to suppuration of the latter, and involves the vitreous and choroid. It always means sepsis, and usually ulcerative endocarditis.

EPILEPSY WITH OPTIC NEURITIS, CURED BY ENUCLEATION OF THE WOUNDED EYE.

GALEZOWSKI, in *Recueil d'Ophthalm.* for January, 1886, reports a case of this nature occurring in a gentleman, aged forty, who had lost the right eye by the explosion of a shell six years before. The anterior portion of the globe had been excised. The stump was still very sensitive. In May, 1883, the patient had the first epileptiform attack, and in the course of two months he had six attacks. Since then the vision in the left eye has steadily failed. In October, 1883, when Galezowski first saw him, vision was reduced to $\frac{1}{xv}$, and there was

marked neuroretinitis. The painful stump was at once enucleated, and was found to be cartilaginous in consistence. The choroid was disorganized, and contained numerous bone-cells. The optic nerve-fibres were atrophied and surrounded by enormously hypertrophied connective tissue. From the time of the operation the epileptic attacks ceased, and the vision in the left eye began to improve, and in April, 1884, he could read Snellen No. IV. with + D. 6. He regards the case as one of reflex sympathetic action, which produced the neuroretinitis and the cerebral trouble. There was produced somewhere in the cerebral substance, either in the crura or optic thalami, a lesion analogous to what the ophthalmoscope showed in the optic disk of the left eye.

ACUTE RHEUMATIC RETROBULBAR NEURITIS.

PERLIA (*Kl. mon. für Augenheilk.*, April, 1886) reports an interesting case occurring in a man, aged twenty-eight. After long-continued exposure to cold and wet, the patient, who was an engine-driver, complained of indistinct vision and great pain in the right eye. There were photophobia and lachrymation, and pressure of the eye backward was painful. All movements of the eyeball caused pain. $V. = \frac{20}{L}$. The field was concentrically limited, especially upward. Ophthalmoscopically nothing abnormal. Two weeks later there was marked improvement in all the symptoms. A few days later the same symptoms developed in the left eye, but in a much more intense degree, vision being reduced to $\frac{20}{CC}$, and the field narrowed to a minimum, but no ophthalmoscopic evidence of any trouble. In both instances the patient was kept in the dark, and the ungt. ciner. was rubbed on the temples twice a day, and mercurial inunction every three hours, according to indications. The result was a perfect restoration of vision and of the visual fields. Perlia regards the case as one of rheumatic inflammation of the sheath of the optic nerve, which extended to the interstitial connective tissue of the nerve, and produced paralysis of the nerve fibres by pressure from the exudation.

THE INSUFFICIENCY OF THE POWER OF CONVERGENCE.

LANDOLT's paper is somewhat technical, but his large experience gives it real value (*Bericht der 17ten Versammlung der Ophthal. Ges.*, 1885). So long as the convergence is positive it may be directly determined by Landolt's ophthalmodynamometer. If it is negative, it may be determined by the strongest abducting prism, which may be overcome in or by distant vision. The amplitude of convergence is represented by the difference between the maximum and minimum of convergence. If it is desirable to know whether the power of convergence of a patient is sufficient or insufficient, and whether any asthenopic symptoms are due to insufficiency of this function, we must start from the maximum of convergence in our elucidation of the question, and we must also know just how much convergence the patient needs for his work. For prolonged work a surplus of convergence is necessary, in order to replace the power lost during the work. It is not until we know this "reserve fund" that we can with certainty say in any given case that insufficiency of convergence, of so many meter-angles, is present. This reserve

force cannot, of course, be an absolute quantity, the same for all cases, but there must be a certain constant relation between the prolonged work and the necessary reserve force, or asthenopia will result.

Experience teaches us that as soon as the amount of insufficiency becomes greater than 1.5 meter-angles, it will be impossible to help the patient by prismatic glasses, for 1.5 meter-angles of convergence correspond to about a prism of five and a half degrees before each eye, which will be found too strong to be worn with any comfort. In such a case we must think of tenotomy of the external recti, or advancement of the internal recti, or of a union of both. Experience has also taught us that there are two kinds of muscular or motor asthenopia, a *peripheral* and a *central* kind. The first is the typical asthenopia muscularis, dependent upon the absolute or relative power of the adductors and upon their insertion. The central form of asthenopia has its cause in the sensorium, and depends upon a disturbance in the innervation of the converging muscles, and in many cases of the power of fusion. Landolt is of the opinion that these two forms of motor asthenopia are frequently characterized by the amplitude of the convergence. In cases of simple overbalance of the abductors, without alteration of the muscles and without disturbance of innervation, tenotomy of one or both external recti gives excellent results. Equally favorable results are gained by tenotomy in cases of absolute diminution of the amplitude of convergence with marked increase of the negative portion, though advancement of the internus generally acts better. In cases where there is diminution of the positive convergence but no increase of the negative portion, tenotomy of the externi is indicated. If, however, the minimum of convergence is only weak, advancement of the interni is preferable.

If both components of the amplitude of convergence are perceptibly diminished, the second or neuropathic form of insufficiency is usually present. Similar conditions are met with in cases of excessive myopia, where, in consequence of elongation of the eyeball, the muscles are extremely stretched and have lost in elasticity, and where the divergent position of the eyes is a still greater obstacle to the action of the interni. The amplitude of convergence may here be reduced to three meter-angles without any considerable increase in the minimum of convergence. In such cases no operative procedure gives satisfactory results, for instead of increasing the amplitude of convergence, all operations will be found to diminish it still more. Prisms are not to be thought of, and even advancement produces but a transient effect.

Landolt also states that even in normal absolute amplitude of convergence and power of accommodation, the relative power or amplitude of these functions may be insufficient. This condition of things is usually met with in young hypermetropes. Operative interference should never be allowed in these cases. He considers it better to regard these cases as examples of excess of relative positive range of accommodation or spasm of accommodation, and to treat them as such.

THE MORE MODERN OPERATIONS FOR TRICHIASIS.

BENSON's paper is a practical one (*Royal London Ophthal. Hosp. Rep.*, xi. 1). In partial trichiasis he advises electrolysis with a Leclanché battery, using ten cells. A fine electrolysis needle is attached to the negative pole, and a

large pad to the positive pole. The needle is then passed along the hair to be destroyed until its point reaches quite to the extremity of the bulb; contact is then made and the circuit completed by applying the pad to the temple or eyebrow. The electrolytic action of the current decomposing the watery elements of the tissues, produces a bubbling of hydrogen gas around the needle, and a slough forms in a few seconds. When the ring formed round the cilium and needle is of sufficient size to insure the destruction of the bulb, the needle is removed and the hair caught by a pair of forceps and drawn out. If it does not at once come out and bring with it a mass of grayish gelatinous slough, it is better to reapply the needle, for unless the bulb is fully destroyed the hair may grow again. Each hair must be so treated, unless two or more grow so closely together that they can be simultaneously destroyed. The advantages of this method of treatment are as follows: 1. We can destroy with certainty and without any disfigurement of the lid, any number of individual aberrant cilia. 2. There is no need for hurry in applying the needle, as no action takes place until the second pole is placed in contact with the skin. 3. The effect can be gauged with perfect accuracy. The cilia which cause trouble in trichiasis are not the normal hairs in an abnormal position, but are generally newborn hairs produced by the hyperæmic condition of the original bulb, which cause the latter to send off buds which develop fresh hairs.

NERVE-STRETCHING—BADAL'S OPERATION.

LAGRANGE's paper (*Archives d'Ophthalm.*, Jan., Feb., 1886) is a discussion of the advantages of Badal's method of stretching the external nasal nerve in the treatment of a large number of grave lesions of the eye. He considers that the laceration and rupture of a sensitive nerve possess great advantages over a simple stretching, and are without any unpleasant consequences, and this is especially true of the external nasal nerve. It is particularly efficacious in relieving the element of pain, when the latter predominates over all the other symptoms. In chronic lesions of the eye, where there is but little pain, but where the anatomical changes are extensive, the result is on the contrary either trifling or nil. In performing the operation, it should be remembered that in most cases the bifurcation of the external nasal nerve occurs within the orbit in front of the pulley of the superior oblique muscle.

Badal's directions for the operation are as follows: Place the index finger on the eyeball immediately over the superior orbital margin, the palmar surface forward and the end of the finger resting against the side of the nose. The point of exit of the nerve is found exactly at the middle of the fingernail. A short curved incision is then made, corresponding to the internal and superior orbital margin, reaching from the internal angle to the pulley of the superior oblique, and about two cm. long. The muscular fibres are then divided, which exposes the nerve with its accompanying artery and vein. A strabismus hook is then passed beneath all three, and elevates them from the periosteum; and on the hook the nervous filaments are isolated and stretched till they are ruptured. The wound is then closed antiseptically. The dangers are suppuration and diffuse phlegmonous inflammation, or the formation of cicatricial bands, which sometimes resemble a veritable cheloid formation.

PARALYSIS OF THE MOTOR NERVES OF THE EYE, AND THEIR TREATMENT
BY THE BROMOHYDRATE OF PELLETIÉRIENE.

GALEZOWSKI here records his results in the use of a decoction of the bark of the pomegranate in the treatment of oculomotor paralyses (*Recueil d'Ophthal.*, March, 1886). He had observed that those patients, who had been taking a decoction of pomegranate bark for the relief of tænia, complained of vertigo and amblyopia, and sometimes of diplopia, and in one of them he had demonstrated a certain degree of spasm in the ocular muscles, which lasted more than an hour. He therefore ordered prepared the bromohydrate of pelletièrene, in the form of a syrupy mass containing crystals, readily soluble in water. He prescribed this in the form of a syrup, of the strength of 1 gramme to 120 grammes, of which four teaspoonfuls were to be taken daily. He records seven cases of amelioration or cure under this treatment. He recalls the experiments of Dujardin-Beaumetz, who injected in man the sulphate of pelletièrene in doses of 50 grammes and produced vertigo, contraction of the pupil, cloudy vision, and marked engorgement of the retinal vessels, with paresis of the lower extremities. Galezowski has not observed that the drug exerts any curative action on paralysis of the ciliary muscle.

RESEARCHES AND REMARKS UPON OCULAR GRAFTING OR
TRANSPLANTATION.

TERRIER (*Archives d'Ophthal.*, Jan., Feb., 1886) gives a *résumé* of the five cases hitherto published, in which attempts have been made to transplant an animal's eye to the empty orbit of the human species. In four of these cases, the eye of the rabbit was employed, and in one case, a dog's eye. The patients varied from seventeen to sixty-six years of age, and the one case which succeeded occurred in a robust man of thirty-five years. In the four unsuccessful cases, the grafts failed on the fourteenth, third, sixth, and nineteenth days after the operation. Terrier thinks that Chibert's "suture en bourse" is bad and ineffective, because the suture which passes through the conjunctiva soon causes ulceration of the cornea. He also disapproves of Chibert's plan of removing all the cellular tissue covering the sclerotic, because it diminishes the chances of cellulo-vascular adhesion. He regards Bradford's method as much superior to the others, viz., the suturing of the optic nerve, that of the straight muscles to the subconjunctival cellular tissue, and finally that of the conjunctiva. He also approves of the iodoform dressings of Bradford, and especially the prolonged occlusion of the eye.

THE INFECTING GERMS CONTAINED IN LACHRYMAL SAC ABSCESSSES,
AND THEIR RELATION TO ANTISEPTICS.

SATTLER's article is one of great importance (*Bericht der 17ten Versammlung der Ophthal. Ges.*, 1885). The only way to recognize the various kinds of microorganisms contained in pus from a lachrymal sac is to isolate them by culture, and as culture-ground the best is what he calls "Fleischwasserpeptonagaragar," which seems untranslatable. In twenty-eight specimens of pus from inflamed lachrymal sacs one variety of coccus was found in eighty-three per cent. of the specimens of the ordinary pus fungus, discovered by Ogston, and first described by Rosenbach: the *staphylococcus pyogenes* in its three varieties,

albus, *aureus*, and *cytreus*. Sattler also found two other cocci-like microbes; one resembling the pneumonia-coccus of Friedländer, and forming moist, grayish, nail-like masses. The other kind grows on gelatine in yellowish-white, elevated masses, with thickened minute edges and wax-like surface, hence the name of *micrococcus cereus*. These cultures consist of round or oval elements, with sometimes roll-like or 8-shaped or rod-like structures in their midst.

Sattler found six varieties of rod-bacteria, only one of which developed real spores of an oval form and strongly refracting qualities. One variety possessed the power of rapidly liquefying the gelatine. Another variety showed a rapid, diffuse growth on agar-agar, but grew very slowly on gelatine. Its cultures consisted of short, very active rods with rounded ends. Another variety consisted of similar thick rounded rods, but destitute of any motion. Another variety consisted of short, slender, movable rods, extending rapidly over the surface of the agar-agar in the form of peculiar fusiform or belt-like, or stellate figures with three rays. The cultures of this variety grow very slowly on gelatine, and resemble the Meibomian glands. The sixth variety consists of rounded, slightly elevated, grayish, punctate masses, opaque by transmitted light.

One important question to be decided is, whether all these varieties of micrococci are endowed with pathogenetic properties, or whether some of them are innocuous. To solve this question, an incision was made in the cornea of animals and a small portion of the pure culture of each variety was introduced into the wound. The most intense suppuration was always caused by the *staphylococcus pyogenes*, accompanied by hypopyon and iritis. The variety resembling the *pneumonia-coccus* and the *micrococcus cereus* also produced suppuration with hypopyon, but not so violent as that caused by the first variety. Among the bacillar-cocci, that variety which resembled the bacteria of putrefaction produced intense hypopyon-keratitis. The other varieties of bacillar-cocci also produced suppuration, but of a much less intense type.

In regard to the antiseptic properties of the iodide of mercury, Sattler differs decidedly from Panas. A saturated solution of this salt (1 : 25,000) is not antiseptic. But it is much more soluble in chloride of mercury solutions, and very readily in potassium iodide solutions. If we dissolve 0.1 gramme of iodide of mercury in 1000 cubic centimetres of a 0.2 per cent. solution of mercuric perchloride, we get a solution which has a greater antiseptic power than the simple 0.2 per cent. of sublimate solution, and is almost non-irritating to the conjunctiva. If we replace the iodide of mercury by the chloride of mercury, or, in other words, use a 0.3 per cent. sublimate solution, instead of a 0.2 per cent. sublimate solution, we do not get the same effect that we do from the mixed solutions of $\text{HgCl}_2 + \text{HgI}_2$.

THE ANTISEPTIC ACTION OF COCAINE, CORROSIVE SUBLIMATE, AND CHLORINE WATER UPON THE SECRETIONS IN DACRYOCYSTITIS, TESTED BY INOCULATIONS OF THE CORNEA.

SCHMIDT-RIMPLER's paper is purely experimental (*Arch. of Ophthalm.*, xiv. 4). His inoculations numbered forty-four, and in all he made a note of the length of time the secretions remained in contact with the disinfecting substances. The muriate as well as the salicylate of cocaine was used in solutions of

four per cent., but there was no perceptible difference in the action of the two preparations. The secretions coagulated in them into small balls. Their infectious nature remained unimpaired after lying in the cocaine solution for from one to three minutes, and after ten minutes they still produced well-marked septic inflammation, though somewhat mitigated in character. Immersion of three minutes' duration in a solution of corrosive sublimate of the strength of 1 to 3000 was usually not sufficient for the complete destruction of the infectious properties of the matter, from five to ten minutes being usually required. Schmidt-Rimpler regards chlorine water as superior to the sublimate in quickness of action as a disinfectant. The chlorine water of the German Pharmacopœia is well borne by the eye. Even spores of the anthrax bacillus, which are endowed with an exceptional power of resistance, become disinfected within three hours, if treated with moist air containing 0.32 to 0.18 per cent. of its volume of chlorine gas. He therefore recommends chlorine water as the best disinfecting substance for the eye.

EXPERIMENTS ON THE ACTION OF BACTERIA IN OPERATIONS ON THE EYE.

KNAPP gives the results of a series of experiments on rabbits, instituted for the purpose of ascertaining how a pure wound differed in its healing process from an infected wound (*Arch. of Ophthalm.*, xv. 1). He first made a pure operation on one eye, using, however, no chemical agents; but operating on a clean, healthy eye with clean hands and instruments—that is, aseptically—and, after the operation, leaving the eye alone without a bandage. The other eye was operated upon in the same way, consequently subjected to exactly the same traumatism, but inoculated in one or another way with a pure culture of bacteria. All the eyes operated upon aseptically recovered, but almost all of those infected with the microbes were lost by suppuration; only those recovered in which the operations had been superficial and limited. The pyogenous microbes employed for the purpose were the staphylococcus pyogenes aureus, albus, and citreus, the bacillus pyogenes fetidus, and the micrococcus of osteomyelitis. He also inoculated several eyes with a fermentation fungus, that of pink yeast. This microbe produced parenchymatous inflammation, but no suppuration, and hence is not pyogenic. Knapp concludes that his experiments, without an exception, have sustained the theory of the bacteriological influence on the formation of pus.

SKIASCOPY; ITS ADVANTAGES AND ITS PLACE IN OPHTHALMOLOGY.

CHIBRET (*Arch. de Ophthalm.*, March–April, 1886) proposes to employ the term “skiascopy,” in place of the terms keratoscopy, retinoscopy, pupilloscopy, and phantoscopy, which have been hitherto employed to designate this method of examination of the refraction of an eye; a method of determining the ocular refraction based upon the examination of the shadows which are formed in the eye when light is thrown into it. This method, he considers, has some advantages: it does not require a refraction ophthalmoscope, but simply a plane mirror; its determinations are independent of the static or dynamical refraction of the observer; it gives an approximate idea of the refraction much more rapidly than the examination with the upright image; it may be

employed with turbulent children, and in cases of nystagmus. If the shadow moves in the opposite direction to that of the mirror, and the pupil immovable, the eye is myopic. If the shadow moves in the same direction as the mirror, the patient is hypermetropic two dioptics or over.

OTOLOGY.

UNDER THE CHARGE OF

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MEMBRANOUS CLOSURE OF THE EXTERNAL AUDITORY CANAL.

HERMAN ROTHHOLTZ, of Gleinitz, relates the following case (*Arch. f. Ohrenh.*, Bd. xxiii. p. 183). In a woman, twenty-one years old, who had suffered from otorrhœa until her fifteenth year, there was found on the right side, three millimetres in front of the membrana tympani, a flat, pseudo-membrana, of tendinous appearance, which entirely closed the auditory canal. This diaphragm was incised by several radial cuts and a cotton tampon placed in the opening, and in a short time the false membrane disappeared. The hearing became considerably better, and the subjective noises, previously annoying, ceased. In three months no tendency to reappear had shown itself. In the much thickened membrana tympani two perforations were detected.

FOREIGN BODIES IN THE EAR.

HEDINGER, of Stuttgart (*Arch. f. Ohrenh.*, Bd. 23, p. 184), reports 133 cases of foreign bodies in the ear, in a total of 12,225 aural patients. The cases offered, as a rule, the ordinary mineral, vegetable, and animal substances which get into the ear. Among the rare occurrences are mentioned: a worm; a collection of beeswax, said to have been poured into the ear, while soft, by a physician, for the cure of tinnitus aurium; an incisor and a molar tooth. The length of time these objects had been in the ear varied from a few hours to fifteen years. Whenever any symptoms were present they consisted in deafness of varying degrees, pain, sense of pressure and tightness, and subjective noises. The reflex phenomena consisted in headache and toothache, dizziness, reeling, coughing, and vomiting. Epilepsy or similar severe neuroses were not observed in any instance. Examination revealed either no local changes, or there were detected swelling, bleeding, and inflammation in the external auditory canal. Several times perforation of the membrana tympani ensued, either as a result of the pressure of the foreign body or of the suppurative process induced by it. In these cases the same observation was made as has been made in other cases of foreign body in the ear, that the lesions in the ear are due to unskilful endeavors at extraction, rather than to the simple presence of the foreign substance in the ear.

Removal of the foreign body was effected eighty-eight times by simple syringing, the posterior wall of the auditory canal being placed downward. Substances likely to swell may be syringed out with oil, instead of water. Instillations of glycerine may be used to contract a swollen substance whenever the removal cannot be speedily accomplished on account of great swelling, and whenever there is no danger in delay, for this method is a slow one. In some instances when a foreign substance lay behind the membrana, it was pushed through the perforation by a forcible inflation from the air-bag. Thirty-four times the author employed instruments for the removal of the foreign substance, most frequently the instrument used being delicate forceps. In one instance a piece of cork, wedged in the auditory canal, was removed by charring with the galvanocautery.

MORBID CHANGES IN THE BONE IN THE AUDITORY CANAL OF ANCIENT PERUVIAN SKULLS.

R. VIRCHOW (*Arch. f. Ohrenh.*, Bd. xxiii. p. 170), in considering this subject, makes first an analysis of the writings of Seligmann, Flower, B. Davis, and Welcker, upon exostoses in the auditory canal, and opposes the hypothesis of Seligmann, that exostoses in this position are due to the custom of slitting the lobule and widening it, common among the ancient Peruvians. The author examined one hundred and thirty-four skulls from Ancona, eighteen of which (three females) showed exostoses in the auditory canal. The most deformed skulls, however, had normal auditory canals. The exostoses in these cases occupy chiefly the outer half of the auditory canal, Virchow having never seen them in the inner portion of the canal. The point of origin of the tumor is invariably from one of the edges (usually the posterior) of the pars tympanica of the temporal bone, which often, in the Peruvians, is incompletely united to the neighboring bone. The surface of the tumor is sometimes smooth, often rough, corrugated, and indented. Sometimes several exostoses occur in close proximity to one another. The author describes the exostoses "as excessive growth (of bone) at points undergoing ossification," since they occur at that point where the cartilaginous part of the auditory canal unites with the osseous portion.

FRACTURE OF THE HANDLE OF THE MALLEUS BY A BLOW ON THE EAR.

DR. A. EITELBERG, of Vienna (*Wiener med. Presse*, No. 43, 1885), gives an account of the rare occurrence of fracture of the handle of the malleus, as follows: The patient, thirty-eight years old, was said to have received a blow, of relatively slight force, upon the ear, and soon afterward perceived a tinnitus, and whenever the nose was blown, a feeling of warm vapor streaming from the affected ear. Examination revealed only a slight dulness in the membrana tympani, and injected vessels on the manubrium mallei, with redness of the broad end at the umbo, the latter being separated from the other parts and pushed forward and downward. From the latter point a fold of the membrane extended to the periphery. Beneath the end of the hammer there was a small perforation with swollen edges. At the second examination, the broken end of the malleus had united with the rest of the handle, the latter appearing thickened and red, but otherwise normal. The fold had disap-

peared, and the edges of the perforation were less swollen. When the author, three weeks later, saw the patient for the last time, the lower third of the manubrium appeared pale, and the point of fracture was indicated only by pale red transverse lines. The perforation appeared to be moving toward the anterior inferior periphery of the membrana. Suppuration occurred at no time.

ABSCESS OF THE BRAIN CAUSED BY OTORRHOEA ; CURED BY AN OPERATION.

This case occurred in the practice of SCHEDE, of Hamburg, and is reported by C. Truckenbrod, of Hamburg, in the *Archiv f. Ohrenheilkunde*, Bd. 23, pp. 188, 189. A young man, twenty-eight years old, suffering from chronic purulent otitis media, was attacked by chill and then fever, with pain in the vertex and occiput.

Upon the strength of these symptoms the mastoid foramen was opened by Schede, and thick, fetid pus was removed. At first, the symptoms improved, but soon the temperature rose to 39.6° C., and then ensued facial paralysis, loss of memory, and aphasic phenomena, and locally the fetor of the discharge increased and oedema set in about the ear.

Cerebral abscess was diagnosed, and an operation undertaken for its relief. For this purpose, the incision over the mastoid was lengthened upward and backward about eight centimetres. After the galea was dissected back, there was detected, about three centimetres above and behind the auditory meatus, a small plug of pus projecting from a small fistula in the bone. Here the bone was chiselled away, but probing the exposed and granulating dura mater did not reveal the presence of pus. Nevertheless, extremely offensive cheesy flakes of pus continuously escaped from between the dura and the bone. Therefore, the cut was extended five centimetres further downward and behind, and the thin bone chiselled away, and by incising the dura mater a cupful of pus escaped from a cerebral abscess about the size of a small orange. This cavity was injected by a $\frac{1}{1000}$ th solution of corrosive sublimate, and drainage kept up. The result was very favorable, as the fever ceased and the general condition of the patient improved. The cerebral disturbances very gradually grew less severe. Subsequently upon two occasions the patient grew worse on account of a reaccumulation of pus in the abscess-cavity. Eighteen weeks after the first operation, the patient was discharged as cured. Yet at times he was at a loss for a word in writing or in describing external objects.

THE RELATION OF THE CHORDA TYMPANI TO THE PERCEPTION OF TASTE IN THE ANTERIOR TWO-THIRDS OF THE TONGUE.

DR. EDWARD SCHULTE, of Berlin (*Archives of Otology*, vol. xv. p. 62), having had an opportunity of observing an instance of accidental division of the chorda tympani, which was followed by paralysis of taste on the same side, has endeavored to investigate anew "the origin of the fibres of taste of the anterior two-thirds of the tongue."

The case referred to was that of a lady, thirty-four years old, who had suffered from left otorrhœa and defective hearing since early childhood. A large polypus was at last found and removed by the snare. Repeated cauterization

of the stump of the polypus having failed to destroy it entirely, an attempt was made to destroy the remnants by a sharp spoon. The procedure was efficient in the destruction of the polypus, but at the same time the chorda tympani was severed. Immediately the patient "experienced on the left side of her tongue a sensation as if a membrane were stretched over it," and at the first meal of which she partook, after her return home, she could not taste any of the food on the left side. The latter appeared to her as if burned, while taste on the right side was normal. When Dr. Schulte examined the patient eight weeks later, "there was no taste for bitter, sweet, acid, or saline substances on the left side, from the tip of the tongue back to the point where the circumvallate papillæ commence." Nor did the same substances, when applied within the limits named to the lateral border of the tongue, produce an impression of taste at any point; while in the posterior third of the tongue, and from the median line to the right, all the statements as to the taste of the substances were prompt and exact. On the application of thermic irritants, such as ice, cold, warm and lukewarm water to the region devoid of the sense of taste, the statements were correct as regards the differences of temperature perceived; but the patient was unable to decide whether the cold or heat emanated from a solid or a liquid substance. On applying a small pellet of ice, she felt a more intense cold than from a drop of cold water, but she was unable to say which of the two bodies was solid and which was liquid. The localization of tactile perceptions, tested with the æsthesiometer, shows no noticeable differences between the anterior part of the left half and the same part of the normal right half of the tongue. The perception of pain within the region devoid of taste was unchanged.

The *membrana tympani* was, on the whole, devoid of defects, excepting a small segment, below and anterior to the short process of the malleus, which, with the flaccid membrane, was destroyed. The head of the malleus was plainly visible on account of the destruction of the flaccid membrane.

It is maintained that this case demonstrates as clearly as an experiment on a living human subject, "that a severance of all the parts of conduction of the chorda is followed by a complete abolition of taste in the anterior two-thirds of the corresponding side of the tongue."

The writer accepts the demonstration of Sapolini¹ as to the existence of a separate thirteenth nerve, of which the so-called chorda tympani is only the peripheral end. In view of this fact he holds that we can no longer speak of a function of the chorda, but that we are forced to assign the duty of supplying gustatory fibres to the anterior two-thirds of the tongue, to the nerve-trunk, called by Sapolini the thirteenth nerve, of which the chorda is simply the termination, while the glosso-pharyngeus innervates only the posterior region of the tongue with fibres of taste.

RUPTURE OF BOTH MEMBRANÆ TYMPANORUM, AND CONCUSSION OF BOTH LABYRINTHS.

DR. KEELER, of Cologne (*Monatssch. f. Ohrenh.*, No. 6, 1885), gives an account of the above-named injury to the ears, as follows: The lesion was produced by an explosion, the membranæ being ruptured close in front of the

¹ Un tredicesimo nervo craniale, pp. 19. Milan, 1881.

manubrium, which healed on the right side without suppuration, but on the left side, on account of simultaneous burning, the perforation healed after suppuration. The effect of the explosion extended to both labyrinths, with greatest intensity on the left side, which was turned toward the source of explosion. It is rather remarkable that the usual symptoms, as hardness of hearing, vertigo, and tinnitus aurium were less marked at first than subsequently, when in addition to these there were various cerebral symptoms, as insomnia, headache, *muscæ volitantes*, irritability of temper, etc. There was no fever, yet the face was very red, and the pulsation of the arteries was very marked. The pupils were normal. In the course of eight months the brain symptoms were not entirely gone. The hearing on the left side was 0, and very much reduced on the right side. Tinnitus very great in both ears, with slight dizziness. It was supposed that a hemorrhage in the labyrinth, with consecutive inflammation had arisen, to which had been subsequently added hyperæmia of the brain.

EXFOLIATION OF A NECROTIC COCHLEA, CONTAINING THE TWO UPPER WHORLS; HEALING OF THE SUPPURATION, WITH ONLY PARTIAL LOSS OF HEARING IN THE AFFECTED EAR.

DR. JOSEPH GRUBER (*Monatssch. f. Ohrenh.*, No. 8, 1885) relates the above-named case. The condition of the hearing was the interesting feature in this instance. Notwithstanding the profound nature of the lesion, a watch was heard in the affected ear, the left, when placed on the cheek-bone, and also upon the mastoid process. The tuning-fork placed upon the left frontal protuberance was heard in the right ear, but from the left cheek-bone and left mastoid it was heard constantly in the left ear. When vibrating tuning-forks were held before the left auditory canal, they were heard by the patient correctly. Further, the patient stated most clearly, that when the tuning-fork was placed on the finger which was pressed into the left meatus, the sound of the fork was heard plainly in the left ear. Moderately loud words were heard in the left ear, the right ear being firmly stopped, and words whispered through the speaking-tube into the left ear were distinctly heard by it. This condition of the ear, after such a lesion, corresponds to some extent with those of Cassells, Christianeck, and Jacobson. It is claimed by Gruber that the present theory of the part exercised by the labyrinth in hearing is considerably shaken by such cases. But it must be borne in mind that partial affections of the labyrinth, even when they induce destruction of certain of its parts, which are considered essential to sound perception, do not necessarily lead to total deafness.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,

PROFESSOR OF DISEASES OF THE THROAT AND CHEST, PHILADELPHIA POLYCLINIC.

TUBERCULOUS ULCERATION OF THE MOUTH.

DR. E. CLIFFORD BEALE has reported (*British Medical Journal*, March 20, 1886, p. 550) the case of a stonemason, aged forty-two years, who had always

enjoyed fair health, with the exception of a chronic winter cough. Shortly after Christmas, 1885, he began to complain of sore throat and difficulty of swallowing, the pain being referred to the right side of the fauces. A slightly painful glandular swelling existed under the jaw on the same side. An irregular rounded patch, of the size of a sixpence, with raised cord-like edges, and a finely granular surface, was found on the mucous membrane between the last molar tooth on the right side and the right anterior pillar of the fauces. This patch, although in close relation to the tooth, did not appear to have been in any way irritated by it. It bore all the characteristics of a partially healed tuberculous ulcer, as seen on other mucous surfaces. No evidence of tubercle or syphilis could be traced elsewhere in the patient, with the exception of a few hard nodules under and in the skin in the front of the neck. These had existed for a long time without perceptible change. Two sisters had died of phthisis at nineteen and twenty-three years of age, respectively, but there were no symptoms or physical signs of the disease in the patient himself.

In a subject of *diabetic phthisis*, under the care of the compiler, a similar ulceration surrounded the posterior inferior molar on the right side, and extended up into the palate. The finely granular surface of the ulcer, in its entire extent, an ovoidal ellipsis one inch in length by one-third at its broadest portion, with corded but not undermined edges, was clean as in tuberculous ulceration generally, save for occasional accumulations of food. The adjoining mucous membrane of the palate was raised by numerous contiguous minute elevations similar in their gross aspects to those of acute tuberculosis of the mouth and pharynx; but there was no intense pain in swallowing, as in acute tuberculosis, nor could any bacilli of tuberculosis be detected on microscopic examination of debris removed by scraping from the bed of the ulcer. All topical treatment, including that by lactic acid, was unavailing, despite the healing of similar looking ulcerations in the larynx under insufflations with iodoform.

In another case, looking very similar, under the compiler's care, an ulceration in a similar locality, associated with unimpressionable laryngeal ulceration, and attended with intense pain in swallowing, exists in an undoubted case of tuberculosis pulmonum et laryngis.

In view of these facts, attention must be directed to the differential diagnosis between ulcerations of the mouth in tuberculous phthisis and ulcerations in diabetic phthisis. Absence of pain and absence of bacilli may be regarded as the discriminative factors.

UNUSUAL WOUND OF THE SOFT PALATE.

One of M. PASTEUR's hydrophobic patients, a child, treated and cured, had been bitten on the soft part of the palate (*British Medical Journal*, March 20, 1886, p. 555).

CYLINDROMA OF THE SOFT PALATE.

SIR W. MAC CORMAC has reported (*British Medical Journal*, March 20, 1886, p. 546) a tumor the size of a tangerine orange, which sprang from the left side of the soft palate of a woman, thirty years of age. It was firm and

elastic. The glands at the angle of the jaw were enlarged. It was excised after preliminary tracheotomy. Free hemorrhage occurred during the operation. Mr. Butlin considered the tumor a transformed round-celled sarcoma.

ACCESSORY TONSIL.

JURASZ (*Monatsschrift für Ohrenheilkunde*, etc., 1885, No. 12) reports an accessory tonsil in an anæmic female, æt. thirty. It was the size of a hazelnut, and attached by a broad pedicle to the side of the pharynx, beneath the orifice of the right Eustachian tube at the uppermost portion of the salpingopharyngeal fold. It was removed with the galvanocautic snare. The operation gave no relief to a paræsthetic condition of the pharynx which had occasioned the rhinoscopic examination; but this paræsthesia—scratching in the throat and irritative cough—subsided under treatment for a concomitant uterine malady.

ACUTE TONSILLITIS AND RHEUMATISM.

The long-known but imperfectly appreciated rheumatic character of many cases of acute tonsillitis has lately attracted considerable attention, and the value of the salicylates in such cases may be duly emphasized. Among other interesting communications we would note those of MR. FOX and DR. EASBY in the *British Medical Journal*, January 9, 1886.

PEMPHIGUS OF THE PHARYNX.

Pemphigus of the pharynx and uvula, as part of the manifestation of acute febrile pemphigus in a negress, has been reported by DR. CHARLES E. GOODING in the *Canada Medical and Surgical Journal*, and an instance of pemphigus of the pharynx in a case of general pemphigus in a married female æt. forty-two, has been noticed by MR. EALES in the *British Medical Journal*, January 2, 1886.

COCAINE TO THE PHARYNX IN HYDROPHOBIA.

Cocaine to the pharynx in a two per cent. solution very much mitigated the suffering temporarily in a case of hydrophobia (*Wien. med. Woch.*, 1885, No. 40; *Centralbl. f. klin. Med.*, March 13, 1886; *N. Y. Medical Journal*, May 1, 1886, p. 508), but did not retard the fatal result.

MYCOSIS OF THE THROAT.

DR. HENRI GUINIER, of Cauterets, reports in the *Revue mens. de laryngologie*, etc., April, 1886, p. 181, a case of mycosis of the tonsil, palatal folds, and the circumvallate papillæ of the tongue. Treatment was not satisfactory, but the deposits disappeared subsequently under influences which improved the general health. The author considers the deposition of these cryptogams as a sign of physiological poverty.

ANEURISM OF THE LEFT INTERNAL CAROTID ARTERY IN ITS EXTREME UPPER PORTION RUPTURING INTO THE PHARYNX.

PROF. M. F. COOMES, of Louisville, reports (*Journal of Materia Medica*, March, 1886, p. 37, from *Med. Herald*) an instance of this rare lesion in a

female subject, the patient dying quickly by a hemorrhage. The aneurismal sac was found wedged between the angle of the jaw and the cervical portion of the spinal column extending almost to the base of the skull.

In a right-sided aneurism in the pharynx, in a male patient now under the compiler's care at the Philadelphia Polyclinic, it is proposed to ligate the common carotid, should the treatment by rest and large doses of potassium iodide not produce marked benefit. Curiously, another of these rare cases has presented in his private practice. The aneurism is left-sided, in a female sixty-five years of age, the subject of diabetes mellitus. These cases are liable to be mistaken for abscess or neoplasm. The pulsation in the lateral wall of the pharynx should excite a suspicion of aneurism of the internal carotid, or of the ascending pharyngeal artery.

LATERAL PHARYNGOTOMY FOR EXTIRPATION OF MALIGNANT TUMORS IN THE TONSILLAR REGION.

PROF. J. MIKULICZ, of Cracow, describes (*Deutsche med. Woch.*, 11 u. 18 März, 1886, S. 178) four cases upon which he operated, the modifications requisite to fulfil the special indications, and the after-treatment; concluding with some remarks on the infrequency of carcinoma of the tonsil, and on the course of the disease.

NEUROSES OF THE PHARYNX.

DR. TH. HERING, of Warsaw, narrates in the *Revue mensuelle de laryngologie*, etc., April, 1886, p. 177, two cases of cough due to rugous thickening of the pharyngeal mucous membrane behind the posterior palatine folds, cured by cauterization, and one due to a red and slightly hypertrophied tonsil cured by extirpation of the gland. The diagnosis was based on production of cough by touching these structures with the probe. He also narrates the case of a college lad with similar cough, in whom intense pains in the neck were excited on touching the parts with the electric cautery, and in whom, after cauterization of several of the largest granulations, torticollis to the right was immediately produced, with painful contractions of the muscles of the neck. This condition lasted for nine days, and ceased with the fall of the eschars in the pharynx, and the cicatrization of the wounds. The cough diminished and lost its nervous character, but reappeared from time to time as a symptom of a concurrent bronchitis. The torticollis was hypothetically attributed to irritation of some nerve filament which escaped destruction in the cauterization, provoking a neuritis which, by its reflex action, was followed by serous infiltration of the group of muscles affected.

Nervous cough from pharyngeal irritation is not infrequent. The compiler can recall, too, a number of instances of persistent irritative cough of several years' continuance, cured by electric cauterization of diseased tonsillar lacunæ, in some instances detected only by drawing the tonsil forward and inward, so as to expose its posterior surface. Little papules, the size of pin-heads, supposed to be of neurotic origin, and situated upon the inner surface of the palatine folds, have likewise been found by the compiler to be causes of occasional irritative cough, which has ceased on their destruction. The indication is, in cases of cough that cannot be accounted for by lesions of

ordinary occurrence, to examine carefully every portion of the surfaces of the pharynx and its contents which can be brought under direct or instrumental inspection.

STRICTURE OF THE ŒSOPHAGUS.

DR. B. WARD RICHARDSON, of London, in *The Asclepiad*, January 25, 1886, p. 65, urges the importance of using all food and drink cold, inasmuch as heated food tends to produce contraction of the circular muscular fibres of the œsophagus, while cold has a tendency to relax them. Heat irritates, cold acts as a sedative; heat excites pain, cold soothes. Hence he advises using a cold tube instead of a warm one in attempts at dilating the stricture. It passes much more easily. He immerses the dilator for a few minutes in chilled butter as the most ready lubricant.

SIR WM. MAC CORMAC reports, in the *Lancet*, January 30, 1886, p. 191, a case of cicatricial stricture of the œsophagus treated by gradual, and afterward by forcible dilatation. Wm. —, æt. twelve, swallowed liquor potassæ, Aug. 13; progressive dysphagia, and emaciation; gastrostomy considered; nutrition by enemata. Sept. 29, urethral bougie No. 4 passed six inches from teeth; stricture seemed less marked lower down; bougie pushed into stomach. Patient swallowed milk. Dilatation with urethral and then with small œsophageal bougies, with gain of ten pounds in weight.

CARCINOMA OF THE ŒSOPHAGUS.

DR. T. S. K. MORTON, of Philadelphia (*Semimonthly Journal of the Proceedings of the Pathological Society of Philadelphia*, January 26, 1886, p. 1), presented to the Society a specimen from a married female domestic, æt. sixty-one, of scirrhus carcinoma of the lower third of the œsophagus, involving the neighboring retroperitoneal glands and, to a slight degree, the head of the pancreas, with numerous small metastatic nodules in the stomach and the liver, principally in the Spigelian lobe, and in no other organs. There was no dilatation of the œsophagus above the cancer. Complaint had begun but nine weeks before admission to the Pennsylvania Hospital, and the patient died twelve days after admission.

A NEW NASAL SPECULUM.

DR. L. KATZ, of Berlin, describes and pictures (*Berliner klin. Woch.*, März 1, 1886, S. 144) a new nasal speculum, consisting of a wire so bent as to enter both nostrils, with an extension to be attached to a headband. It is thus automatically self-supporting, and turns up the tip of the nose at the same time that it distends the alæ.

ŒSOPHAGOTOMY.

MR. BENNETT MAY reports, in the *Lancet*, January 13, 1886, a successful œsophagotomy in a child seven years of age, for removal of a halfpenny swallowed three years and a half before the operation. It had ulcerated into the right bronchus and was lying partially in both tubes. There is a slight constriction at the point of ulceration, but a bougie can be passed and food can be swallowed.

DR. T. M. MARKOE, of New York, reports, in the *New York Medical Journal*, May 1, 1886, p. 481, two cases of œsophageal operation for removal of a foreign body, one of which saved the life of the patient, a man, twenty-four years of age; and he presents an admirable summary of the indications for the operation, and the preferable methods of procedure and after-management.

EPISTAXIS

Cure by antipyrin locally, 1:30 in water on lint, is reported by DR. LAV-RAND (*Journ. de méd. et de chir. prat*; *London Medical Record*, March 15, 1886).

CORYZA.

Beneficial results from insufflations as follows: (1) Menthol, 2 parts; roasted coffee, 50 parts; white sugar, 50 parts. (2) Cocaine hydrochlorate, 1 part; roasted coffee, 50 parts; white sugar, 50 parts; are reported by RABOW (*Deutsche med. Woch.*; *New York Medical Journal*, April 24, 1886, p. 480).

ALUMINIUM ACETICO-TARTARICUM, AND ALUMINIUM ACETICO-GLYCERINATUM SICCUM IN LARYNGITIS, PHARYNGITIS, CHRONIC RHINITIS, AND OZÆNA.

DR. MAX SCHLEFFER, of Bremen, reports (*Deutsche medicinische Wochenschrift*, November 23, 1885) some remarkable results from local applications of those salts to diseased mucous membrane of the upper respiratory tracts. The atrophic tissues acquire a fresher and more normal aspect; and the odor from ozæna is overpowered more quickly than by any other treatment. He recommends it in all affections of the nose, pharynx, and larynx, attended with the formation of crusts or scabs, and he characterizes its action as caustic-astringent. The agent is applied in powder. In half a minute the part is white, as though cauterized. Great sense of dryness is produced, soon followed by intense serous secretion lasting for several hours. Then dryness returns within forty-eight hours, small sloughs fall off, sometimes with slight capillary hemorrhage. The secretions become more mucopurulent, and the crusts loosen with the sloughs. In from five to seven days the action of the remedy ceases; the healthy mucous membrane has recovered its normal appearance, the diseased membrane has become paler, and is more tense upon the turbinate bodies.

The acetotartrate of aluminium is also used as a wash or douche in the proportion of one teaspoonful of a fifty per cent. solution to from one-half to one litre of water. Ten drops of a twenty per cent. solution in 200 parts of lukewarm water, have been used with great effect as a wash and gargle, in chronic nasopharyngeal catarrh with profuse mucopurulent secretion and desiccation into crusts even when associated with pharyngitis sicca.

The glycerated salt is five times as strong as the other. It has been used effectually in simple chronic rhinitis, laryngitis, and laryngeal phthisis. It is no more irritant than boric acid and much more effectual, especially in ulceration of the larynx.

The writer had some acetotartrate of aluminium made for him in Philadelphia, with which he has thus far failed to secure results as satisfactory as those claimed above. Awaiting a supply from Bremen, an expression of

opinion as to its efficacy must be held in reserve. The high repute of Dr. Schäffer leads to the inference that the writer has been working with a drug of inferior quality.

NASAL POLYPI.

MR. SPENCER WATSON, in the *British Medical Journal*, March 20, 1886, p. 548, has devised a new lever forceps for the removal of nasal polypi and the redundant tissues in chronic rhinitis. He thinks that necrotic ethmoiditis (Woakes) exists in but few cases of polypi, if any, but that hypertrophy of the turbinate bodies is frequently associated therewith.

HAY FEVER AND ALLIED AFFECTIONS.

The return of the hay fever season suggests a return to the subject. It may be conceded that certain individuals or groups of individuals inherit or acquire an idiosyncratic supersensitiveness of the conjunctival and nasal mucous membranes and their extensions, in some instances comprising the entire upper air-tracts and even the bronchi. The access of certain well-known dusts to the nasal or adjacent mucous membrane, and in neuromimetic instances, even the dread of the access of such dusts, excites a peculiar train of distressing morbid phenomena to which the general term "hay fever" is applied; not because the train of phenomena is always due to the influence of hay, but because by far the greater number of susceptible subjects are thus periodically influenced by hay and by hay only. This form of the malady, hay fever proper, occurs only during the hay season, and is excited by the pollen from the grasses. Similar attacks in another group of individuals are excited by the pollen of the rose, not only periodically during its natural flowering season, but at any time when the individual is exposed to its influence. A third group, located in certain geographical areas of the United States (Wyman), are similarly periodically affected by the pollen of the *Ambrosia artemisiæfolia* (Marsh), a ragweed which is indigenous to those areas, and which flowers in the month of August, producing the autumnal "hay fever" of the United States, which is not hay fever at all. A fourth group are affected by aromatic substances of various kinds. A fifth group by such dusts as those of ipecacuanha powder, chamomile, etc.; and so on.

DR. ZIEM, of Danzig (*Deutsche med. Woch.*, No. 39, 1885), has published a number of observations on the influence of aromatic substances on the nasal mucous membrane. Aside from the increase of preëxisting hyperæmia of the erectile nasal tissues caused by inhaling the odors of fresh hay and of freshly roasted coffee, there is a group of similar effects from aromatic medicines—balsam of Peru, oil of peppermint, turpentine, pine-needle oil—used in nebulized or volatilized form in blennorrhœa or simple intumescence of the nasal mucous membrane; and a group in which they are due to exposures to aromatic materials in the way of business—from pepper, tobacco, flowers, and perfumery. The only treatment found efficacious is avoidance of the cause. Local treatment has been of no use.

An amusing foot-note, by Ziem, is well worth reproducing. "The so-called reflex neuroses in nasal troubles have just become epidemic. One of the most remarkable performances in this field is a case reported"—the compiler forbears to indicate where—"in which a child with a simple obstructive bron-

chitis could not be cured until his stopped-up nose had been healed. The case was described as a 'good example of vasodilator reflex toward the bronchial mucous membrane.' The author, who had long held this case 'as a curiosity' until '—'s work first offered him an explanation,' seems to be wholly unaware of Kussmaul's observations on pulmonary hyperæmia in the snuffles of children, and those of Hänisch, Voltolini, Rhoden and others, on the connection of certain lung affections with nasal affections. A curiosity is, above anything else, the safest fantasy to which the entire doctrine of reflex neuroses from nasal affections could be ascribed. Reflex neuroses here, reflex neuroses there, reflex neuroses everywhere! Less neurosis and more reflection would be better. The saying of Hippocrates that the nerves explain everything and nothing (*consentientia et conspirantia omnia*) is most applicable just in this connection."

Under the caption of "Hay Fever, Asthma, and Allied Affections," PROF. BOSWORTH, of New York, presents (*New York Med. Journ.*, April 24, p. 462, May 1, 1886, p. 486) a brief historical summary of professional views of this series of maladies, for which he prefers the name given by Herzog, *rhinitis vasomotoria*. A combination of three conditions, he believes, renders a person susceptible; to wit, marked neurotic tendencies, morbid (stenotic) conditions of the nasal cavities, and exposure to the pollen or other germs and spores which produce the attack; the diseases of the nasal passages being those only the tendency of which is to produce vascular turgescence with nasal stenosis. He has seen no cases without notable obstructive lesion in the nasal cavities. In few instances has he failed to afford marked relief by treatment entirely confined to the nasal passages.

NASAL REFLEXES.

DR. EMIL GRUENING, of New York (*New York Med. Journ.*, Feb. 3, 1886, p. 192), has called attention to reflex ocular symptoms in nasal affections; DR. THOS. A. MCBRIDE, of New York (*Idem*); DR. HARRISON ALLEN, of Philadelphia (*Med. News*, March 13, 1886), to migraine and other headaches; and DR. ABRAHAM JACOBI, of New York (*New York Med. Journ.*, Feb. 13, 1886, p. 193), to local choreic movements, all due to nasal and nasopharyngeal diseases. The most elaborate study, however, is that of THEODORE HERING, of Warsaw, "Des Névroses Réflexes déterminées par les affections nasales; Asthme, Spasme laryngé, Aphonie et Dyspnée spasmodique, Aphonie hystérique, Migraine, Névroses," etc., pp. 39, Paris, 1886 (*Extrait des Annales des Maladies de l'Oreille et du Larynx*), to which we would especially call the attention of our interested readers.

ADENOID VEGETATIONS IN THE NASOPHARYNGEAL CAVITY.

DR. MICHAEL, of Hamburg (reprint from *Wiener Klinik*, xii. Heft, December, 1885), presents a short illustrated monograph, containing an excellent description of the malady. He regards rude climate as the chief factor in its development, and attributes little importance to scrofulosis. In operating he prefers cutting forceps, similar to those used by the compiler for more than sixteen years, and has devised a special form of branch, so as to leave an elliptical space for the better protection of the uvula. He prefers operating in a number of sittings without anæsthetic narcosis.

NEOPLASMS OF THE NASAL SEPTUM.

DR. O. CHIARI, of Vienna, reports and collates (*Rev. Mens. de Lar., etc.*, Mars, 1886, p. 121) a number of cases, including seven mucous polyps, seven papillomas, three myxomas, three fibromas, one enchondroma, one adenoma, one myxofibroma, and one of unknown character. The main symptoms are epistaxis and obstruction. Hemorrhage is frequent after operation.

TUBERCULOSIS OF THE LARYNX: LACTIC ACID TREATMENT IN THE LARYNX, PHARYNX, AND NOSE, WITH ESPECIAL REFERENCE TO TUBERCULOSIS OF THE LARYNX.

DR. EDMUND JELINEK, of Vienna (*Centralblatt für die gesammte Therapie, Separat-Abdruck*) confirms the observations of Krause (see this report, Jan., p. 313) as to the great value of lactic acid in the local treatment of tuberculosis of the larynx, in results with which the compiler's experience is in considerable accord. This testimony, emanating from the large clinic of Professor Schrötter, is of especial reliability. The remedy is most successful in the treatment of such ulcerations as are most accessible to the cotton wad with which the agent is energetically rubbed into the tissues in concentrated solution of eighty per cent., or undiluted. Its efficacy is due to its destructive action upon diseased tissue and its innocuous influence on sound tissue, a combined influence not possessed by any other available agent. Jelinek reports a remarkable history in a tracheotomized subject, whose condition rendered it practicable to use the agent energetically without running any danger from spasm of the larynx. This would, we fancy, indicate the propriety of performing preliminary tracheotomy for the purpose of applying the remedy thoroughly under such anatomico-pathological conditions as would risk death by suffocation without this precaution; the more so, as the necessity for the artificial opening would not be continuous, as it is so apt to be when that operation is performed in the same disease for relief from the agonies of stricture, or in the hope of putting the larynx at rest. Unless the diseased tissues can be so thoroughly eradicated that healthy tissue can be reached for cicatrization, and that without imperilling the sound tissues, every local remedy must fail; and this, as argued in the memoir, is the reason that failure has resulted with other agents. It is recommended to begin with a 20 per cent. solution, followed as closely as can be tolerated with solutions of 50 per cent. and 80 per cent., and, finally, with the undiluted acid. Cocaine is to be used in cases of supersensitiveness. Ulcers are well wiped, as it were, with the cotton wad; tumefactions should be more pressed upon. Energetic applications are made daily until a sufficiently large eschar has been produced, and then they are suspended at that point until the slough has, at least in part, become detached; weaker solutions being used meanwhile every day or two. In favorable instances, cicatrization will begin within two or three weeks. Swollen tissues subside under the influence of strong solutions penetrating into their substance, the result being the prompter the more succulent the tissue. A marked instance of this kind was recently under the compiler's care, in which a denuded epiglottis, apparently thicker than the patient's thumb, became reduced two-thirds in bulk within a week's daily use of a

solution of 80 per cent. This and further experience convinces him that Krause has led an important advance in the topical therapy of tuberculosis.

Jelinek details a remarkable case of gangrenous pharyngitis cured in three weeks by twelve applications, after failure to arrest the process by the means usually practised in the hospital. He likewise refers to the value of lactic acid in the treatment of hypertrophic folliculous pharyngitis and hypertrophic rhinitis; observations which can be confirmed by recent experience of the compiler. In applications to the nasal passages, however, Jelinek advises retention for half an hour or longer, of cotton tampons saturated with the remedy, as preferable to energetic rubbings.

CORNU LARYNGEUM.

A unique instance of "cornu laryngeum," a horny papilloma of the larynx, is recorded in detail by DR. A. JURASZ, of Heidelberg (*Berliner klin. Woch.*, 1866, No. 5). It occupied the right vocal band, from which it was removed piecemeal with sharp-edged forceps. It had presented in recurrence after complete extirpation of a neoplasm of resistant, cartilaginous consistence, which had manifested a strong disposition to repullulation during removal in fragments, as opportunity was given.

FRACTURE OF THE LARYNX.

A case of hæmatoma of the larynx due to traumatism has been reported by DR. PÉROTTI (*Bolet. delle malat. delle' orecch.*, etc., No. 2, March, 1886; *Rev. Mens. de Lar.*, etc., April, 1886, p. 222), in a person who fell during a tussle and was kicked in the anterior portion of the neck. Voice underwent gradual enfeeblement, severe dyspnœa augmented steadily, and death ensued in two hours. At the autopsy, abundant subcutaneous, dark colored, sanguineous infiltration was found on both sides of the larynx, more pronounced on the left. The interior of the larynx was obstructed by a sanguineous tumor of a deep blue color. The thyroid and cricoid cartilages were fractured.

A supposed fracture of the thyroid cartilage with recovery after laryngotomy has been recorded by DR. MANBY (*The Lancet*, January 9, 1886).

DR. WM. HUNT, of Philadelphia, has suggested (*vide The Medical News*, May 1, 1886) that the death of Desdemona was due to fracture of the larynx.

ECCHONDROSES AND EXOSTOSES OF THE LARYNX.

M. HENRY BERTOYE, of Lyons, has published an article (*Annales des Maladies de l'Oreille, du Larynx*, etc., April, 1886, p. 125) comprising a summary of the cases previously reported, and the record of a personal observation. His patient, a man æt. 42, entered the hospital in a semi-asphyxiated condition. Tracheotomy was performed. Pulmonary complication ensued, and death took place seven days after the tracheotomy. A large, roundish tumor had been detected laryngoscopically beneath the vocal bands. On opening the larynx posteriorly, a hemispheroidal tumor, of the volume of a large almond, was found on the right side of the internal face of the cricoid cartilage. It proved to be an ecchondroma. Some excellent remarks follow, on pathology, diagnosis, and treatment.

CARCINOMA OF THE LARYNX.

DR. W. LUBLINSKY (*Ueber den Kehlkopfkrebs, Berliner medicinische Gesellschaft, Sitzung, Dec. 9, 1885; Berliner klinische Wochenschrift, Feb. 22, März 1, u. 8, pp. 122, 142, 152*) deplors the indefiniteness of our knowledge of the etiology and clinical course of this disease, in the interest of its early recognition, in order that the utmost benefit may be derived from the great progress made in operative treatment. It is just this early recognition which betters the prognosis, both as to life and phonation, from partial resection, as performed by Hahn and others. From this point of view, Lublinsky deems it necessary to investigate more closely the diagnosis as deduced from a great number of observations. Carcinoma of the larynx is usually primary, and spreads thence to neighboring organs. It is much less frequently an extension from neighboring organs, and least frequently a metastasis, inasmuch as the larynx is little disposed to become the seat of metastatic neoplasm. While its etiology is very obscure, it is evident that conditions of irritation precede its development. Thus men are affected more frequently than women; in the proportion of fourteen to four in the author's cases. Six of these men were strongly addicted to the abuse of spirituous liquors, and three to tobacco. Heredity is not to be left out of consideration. The brother of one of the author's cases had had laryngeal carcinoma; the father of one, gastric carcinoma; and the mothers of two, mammary and uterine carcinoma. The influence of other cachexiæ, especially that of phthisis in the parents, is doubtful. As a rule, the constitution is vigorous, and in marked contrast to the severity of the malady. Previous injury is to be taken into consideration. One of the author's patients dated his disease from a severe choking to which he was subjected. Most cases occur in the latter half of life. Thus, of the 18 patients alluded to, 1 was below 40 years, 5 between 40 and 50, 9 between 50 and 60, and 3 between 60 and 70. As shown by numerous observations, any portion of the larynx may be the seat of the primary affection. Of the 18 cases of the author, only 11 could be utilized in determining this point. The epiglottis was the point of departure in 5 cases, the ventricular band in 2, the vocal band in 2, the arytenoid cartilage in 1, and the arytenoepiglottic fold in 1. The left side was occupied in 7 cases, the right side in 4. In 2 cases the extension was toward the base of the tongue, in 3 toward the interior of the larynx, and in 3 toward the œsophagus. In the vast majority of cases the carcinoma is an epithelioma (squamous-celled, Butlin). The differential diagnosis can hardly be safely made laryngoscopically at first, and the removal of fragments for examination is requisite.

So far as symptoms go, hoarseness is the most important, and it long precedes all other manifestations. Then come irritating cough and expectoration, neither of them pathognomonic, as they accompany nearly all diseases of the respiratory organs. Pain on pressure upon the larynx, and spontaneous pains follow. The pains recur at intervals, long at first, and gradually shorter and shorter, eventually interfering with rest at night. Later in the case the pains dart toward all directions. Nearly simultaneously with the pains, dysphagia begins to be experienced. At a later stage stenosis of the larynx takes place; but, as the obstruction in the respiratory channel is gradually progressive, sudden dyspnoea does not occur. It is manifested at first only upon great exertion, but gradually increases to such an extent as to necessi-

tate operative intervention, the more that danger of syncope is imminent, as well as the paroxysms of suffocation. Hemorrhages occur, often before the formation of tumor, apparently the result of irritation of the mucous membrane by the developing neoplasm. These hemorrhages are insignificant, in comparison to others liable to follow erosion of large bloodvessels. The external conformation of the throat affords digital indications of the diagnosis in exceptional cases only. Intumescence of the neighboring glands is by no means a constant phenomenon. The patient's condition is tolerably comfortable so long as there is no ulceration or extension of the neoplasm in depth. The most important diagnostic agent is the laryngoscopic exploration, to the aid of which microscopic examination of fragments must be instituted. In the early stages there are a variety of forms under which the disease is presented, until the process passes in all forms into a general and almost indifferential picture of extensive ulceration. Mistakes can be made for lepra and lupus, and still more readily with tuberculosis and syphilis.

The prognosis is very sad. When the process is left to itself, no other outcome but death is to be anticipated. The average tenure of life in twelve of the author's cases unsubmitted to operation was two years and a half. Pneumonia and exhaustion are the most frequent immediate causes of death; then come pleuritis, syncope, and asphyxia. The sole method of saving life is complete removal of the diseased tissues. Tracheotomy makes no effort at cure, but surrenders the patient to his general cachexia and to whatever inconvenience may follow extension of the disease through the wound. Laryngectomy, therefore, or when possible partial removal of the diseased tissues, is the course to be striven for when no special contraindications exist. The dangers of the operation are being reduced under better technical procedure, and better after-treatment.

NEUROSES OF THE LARYNX.

An instance of aphonia of about one hour's duration, habitually following hypodermic injections of morphia in a case of delirium tremens has been reported by DR. TREUVELOT (*Journ. de med. et de Chir.*, March, 1886; *Brit. Med. Journ.*, March 20, 1886, p. 563). Examples of spastic aphonia and dyspnoea (reflex) from nasal lesions have been reported by DR. BREBION (*Bull. et. mem. de la Soc. Française d'otologie et de laryngologie*, t. 11, 1886, p. 14), and DR. HERING (*Idem*, p. 19, and *Annales des Mal. de l'Oreille, du Larynx*, etc., Février, 1886, p. 45; March, 1886, p. 89) similar to that reported by Michael, of Hamburg (*Wien. med. Presse*, 1885, No. 41). In several of these instances tracheotomy became necessary, despite relaxation of the spasms under anæsthesia. Space is not at our disposal for a summary. The papers are valuable and ably written. Some years ago, Dr. Thaon, of Nice, reported a case attributed to hysterical paralysis of the dilators of the glottis, in which tracheotomy had to be performed twice.

SPASM OF THE LARYNX IN HYDROPHOBIC TETANUS.

DR. CONRAD BRUNNER details (*Berliner klin. Wochenschrift*, Feb. 15 and 22, 1886, pp. 101 and 126) two cases of hydrophobic tetanus, the respiratory spasms in which he attributes not only to spasm of the thoracic muscles and

the diaphragm, but to intense spasm of the adductor muscles of the larynx in addition, especially because the asphyxia did not reach so high a grade during the paroxysms, after tracheotomy, as before the operation.

PARALYSIS OF THE LARYNX.

In a "Note sur les paralyses laryngées d'origine centrale," in *La France médicale*, Nos. 134 et 135, t. ii., 1885, DR. A. CARTAZ records, among others, a few personal observations, chiefly from the service of Prof. Charcot, tending to show that at the commencement of progressive bulbar paralyses, it is the phonator group of muscles, the lateral and transverse adductors, and the tensors, which are first affected. These are examples of paretic conditions merely, and not of complete paralysis. It may be stated that paretic conditions, similarly limited, in the domain of the abductors or dilating muscles, would probably elude detection, inasmuch as there is no distinct point to mark the extreme limit to the outward excursion of the vocal bands as is afforded by the median line to mark the extreme limit of normal excursion inward. In another personal observation made upon a hemiplegic subject in the service of Landouzy, a paralysis, accredited as abductor paralysis, is evidently a complete paralysis; for the vocal band is described as being in the cadaveric position. Observations in similar instances reproduced from records by Lewin and by Delavan are free from this doubt, for the vocal band is described as remaining immovable at the median line. Three cases are reproduced from Mackenzie, with paralysis in the cadaveric position, and three with abductor paralysis; with two of the latter character from Gerhardt, and one from Penzoldt. Allusion is made to Semon's valuable researches on paralyses of the posterior cricoarytenoid muscles, and to a recent (*Revue de méd.*, 1885) critical review by Lannois upon a presumptive cortical centre for the larynx. The author refrains from any theoretical application of the observations he has made and collected, until he shall have had opportunities for learning whether the lesions in his own cases undergo modifications with the progression of the diseases which have produced them.

STRICTURE OF THE TRACHEA.

DR. J. DRESCHFELD, of Manchester, in discussing this subject in *The Medical Chronicle* for Dec. 1885, p. 177, reports a case in which the characteristic pulse-tracing of aneurism was produced at the left wrist. At the autopsy, the left bronchus was so much narrowed as scarcely to admit a crowquill.

DR. GOUGENHEIM, of Paris, reports, in *Annales des Mal. de l'Oreille, du Larynx, etc.*, Février, 1886, p. 65, two cases of stricture of the trachea and the right bronchus, syphilitic in origin, rapidly ameliorated under large doses of potassium iodide.

A. ROBIN, of Paris (*Idem*, p. 77), reports a case of stricture in which an aneurism of the arch of the aorta ruptured during the introduction of the canula after tracheotomy, with death at once by hemorrhage. At the autopsy, an aneurismal pouch was found which opened into the trachea at the anterior face of its lower portion. The cartilages were absorbed. The perforation had been produced by pressure of the extremity of the canula upon the projecting portion of the aneurism within the trachea.

DERMATOLOGY.

 UNDER THE CHARGE OF

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AND

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 THERAPEUTIC USE OF LANOLIN.

LASSAR, in the *Berl. klin. Wochenschr.*, 1886, No. 5, speaks highly of the value of this new remedy as a basis for ointments. He finds that when rubbed into the skin it disappears almost immediately. If other fats are rubbed in side by side with lanolin, this latter substance can readily be detected by the feel, the skin becoming more turgid, while with the other fats it becomes more supple. On the skin of the cadaver it may be pressed in much further than other fats, the horny layer of the epidermis being penetrated, and it may be detected microscopically in the network of the corium. The experiment was made with cinnabar and lanolin. The author used lanolin upon some four hundred patients, and found that it was very well tolerated, especially so in those cases where, from the nature of the disease, the skin is irritable. As a base for ointments it is to be particularly recommended where deep penetration is desired, as in syphilis, psoriasis, and tinea tonsurans. Where it is desirable to produce suppleness of the skin, the lanolin may be advantageously mixed with twenty per cent. of vaseline or cosmoline.

As examples of its therapeutic action, a case of acute eczema of the face in a child of three years, is mentioned as having been rapidly cured with salicylated (two per cent.) lanolin; also a case of impetigo contagiosa, in which a paste consisting of lanolin 50 parts, salicylic acid 2 parts, oxide of zinc and amyllum $\bar{a}\bar{a}$ 24 parts, was quickly curative. An obstinate case of pityriasis versicolor was promptly relieved with three inunctions of an ointment consisting of lanolin, 88 parts; sulph. præcip., 10 parts; ac. salicylic, 2 parts. In inveterate scabies, in callositas, and especially in acne and sycosis, is an ointment such as the following, possessing the penetrating properties afforded by lanolin, useful: R. Naphthol, 5-10 parts; saponis viridis, cretæ alb., sulphur. præcip., lanolin, $\bar{a}\bar{a}$ 25 parts. As recommended by Ihle, of Leipzig, the author found a 5-10 per cent. resorcin-lanolin salve to be an efficient application for tinea sycosis. In psoriasis, the author had good results from the use of a 25 per cent. chrysarobin-lanolin salve, with much less chance of the chrysarobin dermatitis. In the inunction treatment of syphilis, the lanolin-base is an improvement. In simple seborrhœa, lanolin may be employed with advantage alone, or in combination with sulphur, carbolic acid, etc.

In the discussion which followed, Patschkowski stated that he had experimented with a potassium-iodide-lanolin salve, as regards its ready absorbability, and with satisfactory results. Fränkel remarked that in application

of lanolin preparations to the mucous membrane, he found that the base prevented crust-formation, and, to a certain extent, diminished the secretion. Köbner could, in the main, confirm the author's statements, but he found that lanolin did not hold chrysarobin in solution, but that the ointment appeared simply as a mixture. Vaseline proved a better solvent, but for ointments of chrysarobin, lard is the best base, as this drug dissolves completely in this when the ointment is properly made. Another disadvantage of lanolin is its tenacity, the speaker finding that inunction with the ordinary mercurial ointment was much more satisfactory than when lanolin was substituted—even, in fact, when, instead of a pure lanolin base, 20 per cent. of lard was incorporated. He could, however, corroborate the statement of Liebreich that, in general, medicinal substances such as potassium iodide, etc., incorporated in lanolin, penetrated the skin and were absorbed. Lanolin makes a much better ointment-base when 10–20 per cent. of lard is added. In the use of tar, vaseline seemed to be more satisfactory as a base than lanolin. Liebreich remarked that in the ordinary gray ointment, the pharmacopœia calls for a rubbing up of the mercurial until the globules are no longer visible to the naked eye; with lanolin-mercurial salve, on the other hand, it requires a sharp microscopical examination to detect a trace of the quicksilver. All other bases occasionally proved irritating to the skin; as yet, no such observation had been made concerning lanolin. Chrysarobin, he found to be but slightly soluble in any fatty base—no more so in lard than in lanolin. A great advantage in the use of lanolin as an ointment-base is its property of taking up water. Liebreich mentioned the fact that lanolin had been employed in medicine years before, but subsequently, as a medicinal agent, dropped out of sight. Lassar concluded the discussion by remarking that another satisfactory use he had made of lanolin, mixed with “Buenos Ayres wound-powder,” was as an absorptive dressing for secreting ulcers, etc.

DERMATITIS FEROX.

J. L. MILTON, of London, in the *Edinburgh Medical Journal*, for March, 1886, describes, with this title, a rare and peculiar form of cutaneous inflammation which he thinks has not heretofore been described. The outbreak takes the form of one or more scattered patches on the face, hands, or chest, which are reddish, speedily becoming of a vivid red or lake color, and later brownish, the epidermis crumpling and peeling off or continuing to exfoliate. Occasionally a small patch may ulcerate. There is usually no discharge. The patches generally form very slowly, and, as a rule, it is only later that the health begins to suffer; but in other cases the health begins to fail within a few days after the appearance of the eruption. Sometimes when the disease attacks the side of the face in the male, firm crusts form, so that at the end of a week the case looks like one of rather advanced erythematous sycosis. Such crusts may crack, and may look as if thick serum were exuding from them, but in the early stages, at least, there is no weeping as in eczema.

In every case which has come under the observation of the author, the affection of the skin showed itself first, the constitutional disturbance manifesting itself later. The patches are irregular in shape, generally quite isolated, and usually of a lake color. In two cases the hue was that of

carmine, and the constitutional disturbances were out of all proportion to the extent of the skin affected. The patches often take on an angry look, as though they had been "burnt with fire." Occasionally the lesions assume a papular form, and then resemble "flattened aggregated lichen spots," overlaid by a horny cuticle. There is grave disturbance of the health, with loss of appetite, nausea, headache, inability to walk straight and prostration. The disease bears some resemblance to erysipelas and acrodynia, but is distinct from both. The notes of a case are given at length, the woman, after several relapses during nine months, completely losing her health, and finally dying of pneumonia.

ETIOLOGY OF ALOPECIA AREATA.

MAX JOSEPH (*Centralbl. f. d. med. Wissenschaften*, 1886, No. 11), of Berlin, in the course of an extended series of experiments conducted in the University with the view of determining the significance of the trophic nerves, obtained results which, he thinks, throw light upon the nature of alopecia areata. The experiments consisted in section, peripherally from the ganglion, of the second cervical nerve in cats and rabbits, the operation being followed by symptoms of the cutaneous and hairy systems having the greatest resemblance, if not identity, with alopecia areata in man. Five experiments are detailed. The conclusion arrived at is that this disease must be regarded as a result of disturbed trophic innervation.

RESORCIN IN ACUMINATED WARTS.

CÆSAR BÖCK, of Christiana (*Monatshefte für praktische Dermatologie*, March, 1886), while admitting that in most cases the treatment of acuminated warts is satisfactorily accomplished by means of scissors or a sharp spoon, states that for obstinate, intractable, or recurring cases we have a useful remedy in resorcin, which he has employed for the last three or four years. After instrumental removal of the wart, to prevent a recurrence, he directs a four or five per cent. aqueous solution to be applied four or five times daily, to be continued several weeks. In most cases so treated no recurrence of the disease takes place; should such occur the author resorts to the application of the remedy in powder form with sugar, bismuth, or boric acid, one part to eight parts of resorcin, care being taken to watch the patient from day to day, to guard against undue excoriation or cauterization. Used in this manner, as a rule, a few days suffice. The remedy is particularly useful in chronic cases that have been already much treated, where the wart is no longer pointed, but is flat, thick, and spread out.

LEUCODERMA SYPHILITICUM.

O. ROSENTHAL (*Berl. klin. Wochenschr.*, No. 3, 1886) presents the case of a woman, thirty years of age, suffering with positive signs of secondary syphilis, who, four months after infection, showed a deep dark-yellow chloasma, occupying the greater portion of the face. The woman had been married six or seven years, had been healthy, but had never been pregnant, nor had she manifested any signs of uterine disease. After the internal use of iodide of mercury and iodide of potassium the syphilitic symptoms disappeared, except

the chloasma, which only became paler. Three months later there occurred a syphilitic relapse, together with whitish spots of leucoderma, of the size of a bean or small coin, situated on a darker background on both sides of the neck, where previously no roseola had existed. After a course of treatment with injections the syphilitic symptoms disappeared, but the chloasma and the leucodermic lesions remained. The author regards the view of Riehl and of Taylor as correct, namely, that the affection consists not in a loss of pigment, but in an increase of pigment irregularly distributed.

RHINOSCLEROMA.

PROF. KÖBNER, of Berlin, in the *Deutsch. med. Wochenschr.*, No. 26, 1885, presents a case of the rhinoscleroma of Hebra, which he thinks should more properly be designated "rhino-pharyngo-scleroma," an opinion based upon an investigation of the forty published cases as well as of the five personally observed. The case reported is the first met with by the author during his residence in Berlin, and concerns a strong, athletic man, forty-six years of age, the disease having first manifested itself ten years previously. The nose was deep red and very hard to the touch, the cartilaginous portion remarkably spread out, flattened, and the septum broadened to four or five times its natural size. The hardness arose from a bulky new growth seated in the alæ, septum, and base of the nose, protruding slightly from the nares, and having the appearance of a flat fungus. The undermost of these growths, the size of half cherries, resembled dark red, thinly crusted, uneven, flat condylomata, incision occasioning much pain and bleeding. The lesions completely obstructed the nares. The velum palati was the seat of a warty, partly scarred, extremely hard lesion covered with shallow erosions or ulcerations. On the right side, on the border of the hard palate existed a sharply circumscribed, prominent, extremely hard, smooth, and intact swelling, the size of a bean. The uvula was destroyed, it being the seat of a rigid, whitish-yellow, glistening, much-thickened, scar-like mass. The posterior wall of the pharynx, the larynx, and trachea, were also affected.

A case of rhinoscleroma, similar to the foregoing, is reported by Drs. PAYNE and SEMON, in the *Trans. Lond. Path. Soc.*, 1885, chromolithographic plates accompanying the paper. The patient was a young man, a native of Guatemala. Concerning the pathology, the authors state that in this case the growth was one essentially belonging to the skin or mucous membrane, but infiltrating to some extent deeper parts. The most characteristic portion of the neoplasm was that in the derma, which was profusely infiltrated with a small-celled growth, the elements of which resembled those of granulation tissue, being indefinite in shape or spherical with one large nucleus. In some parts they were much more elongated, spindle-shaped or flat, resembling the fixed cells of connective tissue. The cells were contained in a loose areolar connective tissue, not unlike that of some granulations, but in places this was more distinctly fibrillated, and the elements more spindle-shaped. In some places the connective tissue was composed of very dense thick fibres, with scanty cellular elements, looking almost hyaline, and resembling the tissue of a scar. There were no indications of atrophy or degeneration in any part of the growth. The observations recorded

agree generally with those of Kaposi, though he interprets the appearances differently. They accord more precisely with the results of Mikulicz. The characters are different from those of any other new growth, and are peculiar; the authors inclining to place the disease in the class of granulation tumors, with tubercle, lupus, syphilis, etc. The disease is very rare in England, this case (so far as the authors are aware) being the first authentic one on record in that country.

JANOVSKY, of Prag, likewise reports a similar case in the *Wiener med. Presse*, No. 14, 1886 of this disease, in which treatment with the sharp spoon was followed by beneficial results. Moreover, through the shrinking of the tissues that had been operated upon the surrounding areas were also favorably influenced.

[The rarity of the disease in this country (no well-marked cases having as yet been reported in the United States, we believe) and the fact that it is liable to be mistaken for a syphilitic manifestation, render the subject especially interesting. It was originally thought by Hebra and Kaposi to be a variety of sarcoma, but this view has not been entertained by other competent observers. The histological examination by Geber, Mikulicz, Pellizzari, and others, show the growth to be a profuse round-cell infiltration, which later passes into a diffuse connective-tissue new growth.—EDS.]

PAPAYOTIN IN GLOSSO-PATHOLOGY.

SCHWIMMER, the well-known dermatologist of Budapest, speaks favorably in the *Wiener med. Wochenschr.*, Nos. 8, 9, and 10, 1886, of papayotin in certain affections of the tongue and mucous membrane. After referring to the value of the drug in rapidly softening and loosening the diphtheritic membrane, in the strength of a five or ten per cent. solution, as shown by the observations of Koths and Asch, Krause and Fränkel, the author dwells upon leucoplakia buccalis, characterized by peculiar patches of diseased and thickened epithelium, and the difficulty of its cure in many cases. He alludes to the inefficacy of vaunted remedies, such as solutions of soda, corrosive sublimate, chromic acid, nitrate of silver, alcohol, and ether spray, and, finally, lactic acid, which has been recently recommended by Dr. Joseph, of Berlin. Schwimmer has had a large experience with leucoplakia, which is in this country a rare disease. Twenty-five cases are alluded to, brief notes of ten of these being given in tabular form. The opinion is expressed that from an experience of two years with papayotin it is a remedy which acts happily on the free epithelium, allays pain, and aids the healing process. It is recognized that in the course of this disease, so long as the continuity of the epithelium remains unbroken, no subjective symptoms are usually present; but that, as the process proceeds, and accidents, fissures, or ulcers occur, more or less pain is experienced.

In other idiopathic ulcerations and fissures of the tongue also the author has found papayotin of value. One case of tuberculosis of the tongue is cited, in which it acted most satisfactorily. The following formula was employed:

R.—Papayotin	0.50–1.0
Glycerinæ,	
Aq. dest.	āā 5.0.

The surface, after being dried, is painted from two to six times daily with a soft brush. The purest papayotin should be employed, there being in the market much that is adulterated. The explanation of the working of the drug is found in its remarkable digestive action upon the loose and diseased epithelium, causing this to be cast off, thus allowing a healthier epithelial reproduction and healing to take place.

DELHI BOIL.

J. HICKMAN contributes to the *Practitioner*, for January, 1886, an interesting paper on this disease, based upon cases observed in Umballa. The affection begins as a tense and glistening spot usually about a hair follicle, becoming a vascular and slightly reddened, usually painless, tubercular elevation, indolent, and with hardened base. After from five to ten days the central portion of the tubercle begins to exfoliate in the form of small, dry, glistening scales, which process is repeated several times, eventually extending to the base of the lesion. The tubercle becomes more red; is yielding to the touch; the envelope semi-translucent, through which can be seen small vessels, and later, some yellowish points. At this time also, on pressure, serum may be made to exude. Gradually the deep layers of the skin become involved; serum exudes through a central opening, and dries to large, yellowish-brown crusts, marked by "dissepiments." In one instance, the disease remained permanently in this stage. Ordinarily, however, suppuration and ulceration progress under the crust, new tubercular elevations are generated and in turn break down, the ulceration finally extending beyond the crust, the latter gradually shrivelling and disappearing, leaving an elliptical ulcer with irregular and clipped perpendicular edges, and a base consisting of a mass of reddish granulations dotted with dark points and covered with pus, at times tinged with blood. The ulcer enlarges, new tubercles appearing about the infiltrated edges, and seen in their different stages. The disease may remain in this stage indefinitely, indolent and intractable to treatment. The adjacent glands and lymphatics are often at this stage enlarged. Healing, when it occurs, takes place from the centre outward. It is gradual, and the new tissue may at any time undergo retrogressive change and ulceration, the ulcer returning to its original condition. The cicatrix is shallow, somewhat depressed, striated, sometimes contracted, and eventually of a brownish-yellow color.

The disease is very liable to attack abraded surfaces, excoriations, etc. The wrist, and the region immediately above, are common sites for the disease. Then follow in order of frequency, the elbow, back of foot, face, and the lower limbs; the trunk is seldom attacked. In patients suffering with grave systemic disorders, as leprosy, syphilis, and tuberculosis, the disease usually assumes a serious type, and may give rise to extensive sloughing, and even bone necrosis. In the diagnosis the clinical history and its obstinacy are positive factors. It very closely resembles the tubercular or gummatous syphiloderm. Heredity plays no influence. It is apparently distinct from furuncle. But few cases are met with in those past the age of thirty, and rarely before puberty. It is not contagious, but is inoculable. Microscopically the structural changes are seen to be about the same as observed in lupus. So far, the weight of observation indicates that the origin of the disease is to be found in impure

water-supply, and that the immediate causative agent is the presence of a specific micrococcus, as established by the experiments of Boinet and Despard, and Duclaux. The plans of treatment most successful are those now commonly employed in lupus: caustics, the knife, and the curette. Tonics are also given. Nothing is so certain, however, as a change of climate; recovery follows in almost every instance.

HEREDITARY PREDISPOSITION TO BLEB-FORMATION.

MAX JOSEPH contributes (*Monatshefte für praktische Dermatologie*, 1886, No. 1) an interesting report of four cases—a mother and her three children. The woman was aged thirty-seven, and suffered with the affection since her fourth year. It had never been previously observed in the family. In all regions where pressure from clothing, etc., occurred, blebs, varying in size from a pea to a silver quarter-dollar, would arise. The bullæ were unaccompanied by fever, and the subjective symptoms were slight; trifling itching was noted. The season had a marked influence; the skin being almost entirely free in winter, the eruption appearing most marked in summer. The individual blebs disappeared in the course of several days by gradual absorption and desiccation; or if the bleb wall was accidentally ruptured, a slight and discharging excoriation would result, which, however, would readily heal under simple applications. The general health of the patient was good. In other respects the skin and its functions were normal, except that urticaria factitia could be readily called forth. The woman's oldest child aged fifteen years, and the second, aged twelve years, showed similar blebs, but in these as also in another (third) child, the feet were the region mainly involved. In these cases the affection had existed since infancy, disappearing entirely in winter.

THE TREATMENT OF ECZEMA AND IMPETIGO IN CHILDREN BY THE INTERNAL USE OF CHRYSAROBIN.

A series of cases of eczema and impetigo is reported (*Monatshefte für praktische Dermatologie*, Jan. 1886) by STOCQUART, in all of which chrysarobin, administered in varying doses, effected rapid cures. The cases exemplified the moist and impetiginous varieties of eczema, and the first effect of the drug is seen in the lessened secretion. The daily dose varies from a few milligrammes to several centigrammes, depending upon age and susceptibility. The average duration of treatment was a week to ten days. The author considers the favorable action of the drug to be due to its constricting effect on the capillaries.

MIDWIFERY.

 UNDER THE CHARGE OF

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 ON THE LOWER SEGMENT OF THE UTERUS.

The *Centrabl. f. Gyn.* for November 7, 1885, contains a summary of a paper read on the above subject by HOFMEIER, before the Obstetrical and Gynecological Society of Berlin. Impressed with the great difference of opinion, and the practical importance of this subject, Hofmeier resolved thoroughly to reinvestigate it with the help of all the anatomical material accessible to him. Apart from numerous uteri in the post-partum condition, he obtained seven uteri of pregnant women, and one from a woman who died during labor, all of which were carefully hardened, and then examined. He attempted, with their help, to answer the questions: 1. Is the cervix maintained as a canal till, or nearly till, the beginning of labor? 2. If so, is there a segment of the uterus which differs anatomically from the remainder of the organ, and which should therefore be spoken of as the "lower segment of the uterus?" Lastly, he attempted to connect the phenomena of contraction, which have been recognized since Bandl's investigations, with the anatomical characters.

In answering the first question, Hofmeier relied almost exclusively on the differences in anatomical structure between cervix and uterus for determining what was cervix, and he found that in all his preparations the cervix could easily be distinguished, and invariably maintained its shape. In a few instances, it is true, a slight funnel-shaped expansion toward the uterine cavity was present, but on considering the whole case both anatomically and clinically, he concluded that this was certainly to be explained as due to labor pains. Since at the margin of the anatomically well-defined cervix, the other characteristic landmarks were also present, and, on the other hand, the margin between the cervix and uterus was always spoken of as the internal os uteri, Hofmeier infers that the portion of the cervix which in the non-gravid uterus is spoken of as internal os uteri, also forms the boundary of the uterine cavity in the pregnant organ until the onset of "pains."

2. The "contraction-ring" invariably forms along the line of the firm attachment of the peritoneum to the uterus, which line in the pregnant organ always lies four or five cm. above the internal os described above; this portion of the uterus should, therefore, be spoken of as the "lower segment of the uterus."

From its naked-eye anatomical structure it appears to belong to the uterus, not to the cervix, in which the muscular bundles of lamellæ diverge. In its minute, and especially in its microscopical structure, it, however, shows certain characteristic peculiarities by which it differs from the proper body of the uterus, and which justify a special name. Physiologically this lower segment belongs to the cervix, since, as shown by several direct observations, it is probably passive from the beginning of labor, and takes no, or almost no, share in the active contraction of the rest of the uterus. After expulsion of the fœtus, it is always perfectly passive. Pathological stretching of this seg-

ment, as a rule, only occurs where there is great mechanical obstruction, or, in multiparæ, after incomplete involution.

PARTURITION DURING HYPNOTISM.

PRITZL, in the *Wiener med. Wochenschrift*, Nov. 7, 1885, relates a case illustrative of the conditions named above: S. M., æt. twenty-six, primipara, was admitted to the Lying-in Hospital September 10, 1885. Previous health good; no neurotic history. While the woman was in the hospital, it was found that she could easily be rendered hypnotic by steadily looking at a shining thermometer bulb. In order to induce this condition, the bulb was held about six inches from her eyes and moved slowly to a point a little above them. As soon as her eyes turned up in a state of convergence, generally after looking for ten seconds, she became unconscious, insensible to pricks with a needle, and touching her cornea, etc., caused no reflex.

During the night of October 30, the premonitory signs of labor appeared. Pritzl examined the patient on the 31st, and found the fœtus in the second position, the external os admitting two fingers. At eight P. M. the os had dilated enough to admit three fingers. Pritzl then ruptured the membranes, whereupon the pains grew stronger. The patient became greatly excited, throwing herself about and showing all the signs of severe labor pains.

At this stage Pritzl resolved to induce hypnotism in the usual way. One look at the shining bulb sufficed to render the woman devoid both of consciousness and sensation. This was done at 10.45 P. M.

The pains, now that the woman was hypnotic, differed in several respects from their previous character. When the woman became unconscious, the interval between the pains averaged almost two minutes; the pains themselves increased in severity, and lasted on an average fifty seconds. While at the acme of each contraction, the abdominal muscles coöperated vigorously, certainly not less so than during ordinary labor. As long as the pains lasted the woman remained perfectly unconscious, though at times she flexed her left forearm and showed some stiffness in the left leg. Her head, too, was tossed from side to side, and now and then she frowned and groaned; during the intervals between the pains she lay perfectly still, as if asleep.

The strong pains did not remain ineffectual, and the os uteri became easily stretched by the advancing head; at the twelfth pain the vertex slid over the perineum through the vulvar fissure, and the child was born at 11.15 P. M., weighing 2900 grms., measuring 50 cm. in length, and it began at once to cry lustily. After a period of repose, lasting five minutes, the uterus again began to contract energetically, the pains now lasting for a somewhat shorter time than they did during the expulsive period (on an average, thirty seconds), though equal to them in severity.

The abdominal muscles were used with more energy than Pritzl had ever seen them in the after-birth period. The placenta was not expelled into the vagina till the fourteenth pain, whereupon uterine contractions ceased. After waiting three-quarters of an hour, Pritzl removed the placenta by traction on the umbilical cord. The mother was then waked by shouting and shaking her, and, more than all, by liquor ammoniæ fort. being given her to smell. On becoming conscious, she was extremely surprised at the comple-

tion of her labor, and declared that, from the moment when the bulb was held before her eyes she had slept well. The post-partum period passed off normally in every respect.

ON THE FORM OF THE UTERINE MUSCLE-CURVE AND ON PERISTALSIS OF THE HUMAN UTERUS.

In the *Centralbl. f. Gynäkologie*, Oct. 3, 1885, a summary is given of SCHATZ's investigations relating to the above. He finds that in some cases the ascending and descending portions of the muscle-curve are exactly alike, except that the latter presents a longer tail, much as is seen in contraction-curves of striped muscles. As a rule, however, the ascending portion is considerably steeper than the descending, the reverse being only rarely met with. Schatz was at first inclined to think that the slowly descending curve was due to exhaustion, but he soon gave up this view. Nor can he accept the explanation, suggested by the analogous phenomena in striped muscles, that it is due to extension and shortening (extension where the uterus meets with difficulty in emptying itself, shortening where it becomes emptied during a pain), though he is convinced that the contraction-curve is modified by the pains being effectual or not. After numerous laborious experiments, he has come to the opinion that the various contraction-curves are simply due to the fact that the whole uterine muscle does not contract simultaneously, but in a peristaltic manner. In addition to the peristalsis, the form and distribution of the muscular elements have some influence, though this is of secondary importance. In a cylindrical uterus the ascending and descending portions of the pressure-curve will be the same. But in a conical or funnel-shaped uterus the contraction-curve will first ascend rapidly and then slowly fall, since a higher internal pressure results when the upper than when the lower end contracts. The muscular tissue of the uterus affects the form of the muscle-curve according to the thickness of its several zones. When the thickest, and therefore most powerful zone, is above the middle of the uterus, as is generally the case, the greatest intrauterine pressure, and therefore the acme of the pain, will occur before its middle, the ascending limb being therefore the steepest, the opposite holding good in the rare cases where the thickest zone is in the lower portion.

As regards the direction of the peristaltic movements, it runs in the human uterus, as in that of the lower animals, from the ends of the Fallopian tubes to the os uteri.

Schatz is inclined to think that entire zones of the uterus are simultaneously at the same phase of contraction, so that peristalsis does not advance gradually, but by leaps.

QUININE AS AN OXYTOMIC.

In the *Atlanta Medical and Surgical Journal* for March, 1886, attention is drawn to the use of quinine as an oxytomic, by J. A. COE and J. E. ALLEN. That quinine has no action on the pregnant or non-pregnant uterus in initiating contractions, is a fact which is fully borne out by the experience of all medical men in malarial districts. On the other hand, when given in doses of gr. x and upward during labor, it is capable of exerting a stimulant action

on the uterus. This action is probably the result of its effect upon the cord, quinine acting as a cerebro-spinal depressant. By lessening the abnormal sensibility of the inhibitory centres of the cord, it allows the normal reflexes to go on, and thus indirectly increases the action of the uterus.

ON THE POSSIBILITY OF PERCEIVING THE CARDIAC IMPULSE OF THE INTRA-UTERINE FŒTUS WHEN THE LATTER IS EXTENDED.

In *Centralbl. f. Gyn.* for Dec. 5, 1885, FISCHEL claims that he, together with Dr. Bayer, discovered the above phenomenon quite independently of Prof. Valenta (though he admits the claims of priority of the latter), and that while Valenta merely asserted that with very thin abdominal walls it is sometimes possible with a first face presentation (*i. e.*, chin to the right) to feel the cardiac impulse, he (Fischel) showed that the phenomenon could be observed in all cases of extended attitude in the second position (chin to the left), also stating that he himself had in the latter actually observed it with vertex, brow, and face presentations.

Fischel considers that, owing to the peculiar topographical relations, this phenomenon is most easily perceived in the second position, the first being very unfavorable for its recognition. In the latter it can only be done when the long diameter of the face is pretty nearly in the antero-posterior pelvic diameter, and when the thorax of the child lies close to the anterior wall of the uterus. Since at this time the face is generally already on the floor of the pelvis, the foetal cardiac region can be but little above the symphysis, where the bladder, generally more or less filled, is interposed between the uterus and abdominal wall, and must increase the difficulty of detecting this phenomenon, so that it is very rarely noticed in the first face position.

Fischel, moreover, has observed it not merely where the abdominal walls were very lax and thin, and the uterine walls also very thin (as is said by Valenta to be necessary), but also in well-nourished women with moderately thick layers of fat, and without the uterus being very thin-walled; the phenomenon is further favored by rupture of the membranes having taken place, for so long as these are entire the foetal thoracic region is not always in close contact with the uterine wall.

As an important etiological factor, he mentions that in all his cases the labors were somewhat delayed, and that the foetal cardiac region was placed below the "contraction-ring" in the stretched lower segment of the uterus. He has, moreover, seen it in a transverse position, especially in the right shoulder position, abdomen to the front, and in a first pelvic end presentation associated with an extended attitude. In conclusion, Fischel claims that his observations as regards this phenomenon are much more complete and much more satisfactory as regards the genetic relations than those of Prof. Valenta.

SOME RECENT CONSIDERATIONS ON THE PREFŒTAL DILATATION OF THE VULVA, ACCOMPANIED BY A STUDY ON THE FORMATION AND RUPTURE OF THE SAC OF THE LIQUOR AMNII.

DR. LÉON DUMAS, in *Annales de Gynécologie* for Sept., Oct., and Nov. 1885, referring to an article published two years ago by himself under the title of "Prefœtal Dilatation of the Vulva," acknowledges that he has since that

time been on the watch for an opportunity of again bringing the subject before the profession; this opportunity, he thinks, he has found in the publication by Dr. Byford, of Chicago, of a paper entitled "Functions of the Membranes in Labor." The author allows that Dr. Byford comes to the same theoretical conclusions as those from which he himself starts, but differs entirely as regards the application of those views. Before going into a discussion of the merits of his own views, he puts Dr. Byford's opinions briefly before his readers.

Résumé of Dr. Byford's ideas. Briefly considered, these ideas are: (1) that just as the bag of membranes dilates the cervix uteri, so they should be allowed to distend the vulva; and (2) that every effort should be made to preserve the membranes intact until the head passes the perineum; with this view the woman is directed to keep quiet, resting on her back; she is not to strain, and violence of pain is to be kept in check by opiates or chloroform. The advantages claimed by Dr. Byford for his method, are safety for the perineum, absence of tendency to prolapse on the part of the umbilical cord, and possibility of correcting malposition of the head, even when the latter is engaged in the pelvic cavity; should the amniotic sac rupture prematurely, Dr. Byford resorts to digital pressure or inflated air-bags to effect the dilatation of the vulva.

Examination of the method proposed by Dr. Byford. Granted that the principle recognized by the American accoucheur is correct, the question of real importance becomes this: "Is it possible, in the majority of cases, to reckon on the bag of waters for the dilatation of the lower orifice of the vagina?" The author of this paper answers unhesitatingly in the negative, and claims that his reasons for so doing are based on a strict observance of nature's usual method; certainly in most cases the membranes rupture as soon as the cervix is completely dilated, and not before. Dr. Ribemont has shown experimentally that a great difference frequently exists in the toughness of the membranes, and that, *cæteris paribus*, the time of spontaneous rupture largely depends on this. Dr. Byford considers that allowing women to walk about during the first stages of labor is distinctly injurious, and favors early rupture of the membranes. Dr. Dumas entirely disagrees on this point, and considers that in many cases of uterine obliquity the very reverse is the truth. It may be then taken for granted that, as a rule, under normal conditions the waters break away under the influence of uterine contractions soon after the dilatation of the cervix is complete. Dr. Byford quotes those cases in which the fœtus is born with a caul in support of his views; he maintains, too, that the membranes becoming detached from the lower segment of the uterus are driven through the dilated cervix with the head, until they come into contact with the vaginal walls, as yet undilated; from these latter they receive support till the vulva is reached. The author rebuts the above assertion by drawing attention to the lax state of the vagina in the latter part of pregnancy, and the impossibility of any support from the vagina when the uterus is exerting a force of ten to eleven kilogrammes above. Dr. Dumas goes still further, and seeks to demonstrate the utter impracticability of preserving the bag of waters intact until the vulva is reached under ordinary conditions, whatever precautions may be taken.

The behavior of the membranes during the obliteration and dilatation of the

cervix. The question is put by Dr. Byford, "What is there to hinder the membranes from arriving at the vulva?" To this the author replies, "the sudden distention to which they must yield when the neck of the womb is completely or almost completely dilated." According to Ribemont, two elements are possessed by the membranes: (1) that of resistance, and (2) that of extensibility; and, according to Dr. Dumas, the last named is the most important. Remembering how the limit of extensibility depends on the force not being applied too suddenly, and pointing out that at the moment of complete dilatation of the cervix, and at that moment only, the membranes are subjected to a sudden distention which did not exist before, the conclusion becomes inevitable that rupture of the membranes at that moment is inevitable and under normal conditions will happen then and then only. After a brief review of Cazeaux's opinion, that the bulging of the bag of membranes is not due to an elongation of the membranous sac, but rather to a change of shape on the part of the ovum, attention is called to the fact that in the obliteration of the cervical canal and the dilatation of the os, considerable change is effected in the relations of the lowest part of the membranes. This lowest part of the ovum, which during pregnancy adhered to the lower uterine segment, comes, at the onset of labor, into relation with the cervical wall. Two hypotheses only can explain this: (1) either the membranes have undergone an enormous distention at the level of the cervix, and have furnished a finger-like prolongation which has advanced as far as the os externum; or (2) the membranes have become separated to a certain height from the lower segment of the body of the uterus, and so have come in contact with the wall of the obliterated cervix. Dr. Dumas pins his faith to the last of these two views, though he admits that the majority of authors differ from him. Two clinical facts may be quoted in support of the theory that separation of the membranes takes place: in inducing premature labor near the end of pregnancy by means of the passage of a flexible catheter, it is found that the instrument passes to a certain distance easily, but then meets with resistance, owing probably to its having reached the point where separation of the membranes from the uterine wall still remains to be accomplished; in the second place, at the onset of labor, or a few days previously, mucus streaked with blood is often discharged per vaginam, and it may reasonably be surmised that these blood streaks result from the rupture of small vessels during the separation of the membranes. An argument again might fairly be drawn from cases of placenta prævia; if the placenta in these instances so readily separates from the uterine wall, is it more difficult to believe that the lower part of the decidua may do the same?

By the aid of diagrams the relation of the membranes to the lower uterine segment and cervical canal during obliteration and dilatation of the cervix is shown, and then the author propounds two alternatives—either there is separation and a gliding movement on the part of the membranes, or else there is an enormous distention of the sac sufficient to allow of its reaching the os externum. Now by experiment it is possible to show that the membranes cannot support a pressure capable of bringing them by distention to the external os without rupturing; proof of this is given by the investigations of Matthews Duncan. The latter author has shown that the elasticity of the membranes seldom passes the limit of two and a half centimetres (one inch),

and as an elongation of five centimetres (two inches) would be required if the distention theory was correct, it is evident that delivery could rarely take place without premature rupture of the membranes. It may be well here to notice two pieces of clinical evidence: If the lower extremity of the membranes really came lower down in consequence of their distention, their progressive descent in the pelvis ought to be capable of being recognized, and again the measurement of the ovum from above downward ought to increase, and yet neither of these points is capable of demonstration. It is true that some authors claim a lengthening of the ovum to take place during labor, under the influence of what Schatz has termed the "force of restitution of the form of the uterus," but this at most amounts to only six millimetres (one-quarter inch), and can only take place when the pains are powerful, and quite different to those required for the obliteration of the cervix. Again, as regards the descent of the ovum into the pelvis, it is clear that when this exists it is due to the fact that the whole uterus has sunk in the pelvic cavity, and not to any individual lowering of the ovum; the bag of waters, even during a pain, is seldom more than a few millimetres in advance of the head, and in the intervals lies unstretched and slightly wrinkled. If, then, the membranes cannot even stretch sufficiently to reach the os externum, they certainly will not reach the vulva and distend that, as Dr. Byford would demonstrate. By the aid of further diagrams, the author shows how, during the process of obliteration of the cervix and dilatation of the "os," the lower segment of the membranes comes in contact with correspondingly lower segments of the utero-cervical canal, until at length dilatation is complete, and the projecting part of the sac of the membranes bulges down free into the vagina. The question might fairly be asked at this point, why, if the extensibility of the membranes can be altogether disregarded, the process of separation does not go on still upward, and affect all the rest of the membranes, placenta included. This is just the point which will be brought out on examining the action of the muscular wall of the uterus; though the length of the cervix has been added to that of the body of the uterus, still the total length remains the same; or, in other words, the body of the womb has shortened up. Thus, during dilatation, as well as during obliteration of the cervix, the latter is drawn upon and elongated upward, while at the same time the body of the uterus becomes thicker and shorter. Two important clinical facts prove the above statements: in the first case, when the anterior lip has been caught between the advancing head and the symphysis, it is found on freeing the imprisoned lip that the whole cervix is rapidly drawn above the head, though the latter does not descend an iota; and, in the second place, where the head lies low in the pelvic cavity, resting on the perineum before dilatation is effected, the latter process is completed, and the cervix is drawn above the head without any further real descent of the vertex. From the consideration of the above description, it may be seen that it is not the ovum which separates itself from the uterine wall and glides toward the os externum, but the uterine wall which separates from the ovum in the course of retraction, and glides upward along the membranes dragging the cervix from below upward. The point where the process of separation ceases can scarcely be fixed with accuracy, but probably the pressure of the circumference of the fetal head on the external mouth of the uterus subjects the membranes to an amount of

distention which prevents further separation. The author does not deny that the membranes possess the power of extensibility to a small degree, but does not attach much importance to this feature in the progress of labor; he calls attention to their permeability by liquids, and gives this as a safeguard against premature rupture with escape of the liquor amnii.

Mechanism of the preservation and of the rupture of the bag of waters in normal cases. From what has been already put forward, it will be evident that as soon as dilatation is complete, and the membranes have reached their limit of extensibility, viz., two and a half centimetres (one inch), rupture under normal conditions must follow. Attention is called to one additional point: owing to the close adaptation of the child's head to the lower uterine segment, the pressure on the amniotic fluid lying between the vertex and the presenting membranes is not equal to that exercised on the bulk of water above, not, at all events, until dilatation is complete; the pressure supported is the total uterine force, minus the resistance of the cervical tissues. By the above consideration it is evident that the chance of premature rupture is greatly lessened.

Application of the foregoing theory. If the line of thought already pointed out is followed, there is no difficulty in seeing how, after the expulsion of the fetus, the membranes and placenta will be separated in the same way by the contraction and retraction of the upper part of the uterus. Possibly in the light of this theory one of the determining causes of labor may be found, the separation of the membranes being produced in the first place by the uterus absorbing the cervix in order to make more room for the enlarging ovum, and then the contact of these membranes with the cervical surface setting up reflex stimulation. Retention or non-separation of a portion of the membranes in cases of hasty delivery would also be accounted for by the theory propounded. One, however, of the most interesting applications is the bearing the theory has on the explanation of cases of "placenta prævia." Without going over the whole ground, it will be seen at a glance that it accounts for all the phenomena observed, and satisfactorily bridges over the gaps so patent in the theories of other observers. There are a few facts which can, indeed, be scarcely explained apart from the theory now under discussion; these may be briefly summarized:

1. Analogy between the mode of evacuation of the uterus and certain other hollow organs.
2. The apparent and real mechanism of the mechanical dilatation of the cervix.
3. Cause of the form "en boudin," which the bag of waters presents at times.
4. Premature rupture of the membranes.
5. Rupture at a point high up in the uterine cavity.
6. Rupture retarded.

The author quotes the peristaltic action of the intestine, the mode of action of the pharynx in deglutition, and the method in which the segments of the mitral valve come together leaving the ventricle full of blood, as illustrations of analogy. Regarding the second point, attention is drawn to the fact that the presenting bag of membranes is really a "passive" dilating wedge, the cervix using it as a supporting point over which to withdraw, and not being actually

pressed open by the active incursion of the former. The presentation "en boudin" is doubtless due sometimes to the unusual elasticity of the membranes; but, as a general rule, it is caused by the foetal part remaining more or less unduly elevated above the bag of waters. As a result of the membranes separating to an undue height, the influence of the presenting foetal part on the form of the sac of waters is lost, and the membranes are able to assume the glove-finger shape. In consequence of this, the tension is low in the presenting sac, and dilatation progresses but slowly. Premature rupture can usually be explained, disregarding cases of extreme thinness or delicacy of the membranes, by the existence of conditions which at an early stage allow of the whole intrauterine pressure being brought to bear on the presenting bag of membranes. Such are cases of contracted pelvis, face, shoulder, and breech presentations. Rupture at an elevated point in the uterus is probably to be accounted for by the membranes having a firmer attachment at one part than another, since, owing to this, separation takes place in a less regular method, and unequal dragging causes rupture. Other causes, such as blows, shocks, or irregularly violent pains, are possible. Reasons for delayed rupture can easily be formulated, if we study the mechanism in the cases already considered.

Refutation of Dr. Byford's views. Superiority and new advantages of prefœtal dilatation of the vulva. The advantages which Dr. Byford claims for his method are, that it enables a faulty position to be redressed when the head is in the pelvis; and, secondly, that it affords a safeguard against prolapse of the cord. It is difficult to see how either of these advantages is secured by retaining the bag of membranes intact till the vulva is reached. As a matter of fact, Dr. Byford's method may become a source of real injury to the mother, first, by the tedious labor it entails, and, secondly, by encouraging the separation of the membranes to proceed so far up the uterus that the placenta may become detached and the foetus thereby asphyxiated. The elastic, dilating bag with which Dr. Byford proposes to dilate the vulvo-vaginal orifice in case of early rupture of the membrane is also useless, for if tightly distended it causes exquisite pain; and if only partially filled, it is driven out by the pressure from above. Equally faulty is his idea of passing two or three fingers into the vagina and pushing back the perineum during the pains. In concluding, two special points in his own method of treatment are dwelt upon by the author. The vulvo-vaginal orifice having been rendered yielding and dilated by digital manipulations, a moment is chosen when a strong pain is over, and then the patient being directed to avoid straining, the right hand being laid flat on the posterior commissure of the vulva and the anterior part of the perineum, these latter parts are pushed backward over the foetal head, which at the same time is supported and kept in its present position. The chin once reached by the above method is disengaged by pressing on it with the finger-tips across the perineum and from behind forward. Regarding the most suitable time for executing this movement, advantage should be taken of the moment when the fingers, which execute the prefœtal dilatation, feel the frontal bosses at the fourchette or the line of the hair on the child's forehead. In all cases the manœuvre is to be carried out in the interval between two pains. The second point that is dwelt upon is the necessity that exists for careful observation lest the head

should be incompletely flexed when presenting at the lower outlet; inattention to this point may not only mar the success of the author's manœuvre, but lead to ruptures of the vestibule and adjoining tissues. Dr. Dumas concludes by reference to observations taken by M. Passarini, confirming the success of his method; and also points out how greatly the period of expulsion is shortened. In a short note appended to his paper, he condemns the use of all instruments (including a special speculum invented by Prof. Carlo Minati, of Pisa) for prefœtal dilatation, and claims for digital dilatation that it possesses the advantages of delicacy of manipulation and accuracy of information such as may be gained in no other way.

DROPSY AND ALBUMINURIA IN PREGNANCY.

LEYDEN contributes an article on the above subject to the *Deutsche med. Woch.* for March 4, 1886. He defines the nephritis of pregnancy as a disease associated with pregnancy, and one which is liable at any time to induce attacks of eclampsia. It commences during the second half of gestation with albuminuria and dropsy, both of which increase till the onset of labor, and then rapidly subside. By these characters it may be diagnosed from other renal diseases accompanying pregnancy.

As regards the anatomical characters in the kidneys, there is much difference of opinion amongst various authors. Leyden in three cases has found large, pale kidneys with a good deal of fat in the tubules, and believes that both the symptoms and post-mortem appearances are best explained by a prolonged state of arterial anæmia.

The prognosis is generally thought to be good so long as no eclampsia supervenes. Leyden, however, has seen cases which ended fatally apart from any symptoms of eclampsia. Moreover, in several cases under his care, a chronic disease of the kidneys ensued, which generally took the form of renal atrophy.

THE ADVISABILITY OF INDUCING ABORTION IN CASES OF SO-CALLED UNCONTROLLABLE VOMITING OF PREGNANCY.

This subject was brought before the Obstetric Section of the Suffolk District Medical Society, Dec. 16, 1885 (*Boston Medical and Surgical Journal* for Feb. 11, 1886, p. 121). DR. O. W. ROE related a case in which the question of inducing abortion arose. The patient was nearly three months advanced in pregnancy. She had taken no nourishment by the mouth for nearly five weeks, as even the mention of food would excite vomiting. Nausea was constant and intense; vomiting occurred every two or three hours. Any sudden noise or sudden appearance of any one by the bedside, would excite vomiting. Though the enemata were well retained, the patient had become greatly emaciated, and too weak to move herself in bed. There was excessive pytalism, especially at night; at other times thirst was intense, tongue parched and dry, breath very offensive, and along the course of the œsophagus and at the epigastrium there was marked tenderness. Pulse 116, temperature 97°. The cervix was firm and unyielding; the os only slightly patulous. The uterus was morbidly anteverted, the fundus resting against the rami of the pubes, and, on examination, could be raised up out of the cavity of the pelvis, but

fell back again directly upon the removal of the finger. In the preceding pregnancy it is stated that "the nausea and vomiting, though much less severe, yielded suddenly and completely at the beginning of the fourth month after the attending physician had, on vaginal examination, by chance raised the uterus high out of the cavity of the pelvis." In the present case the exciting cause of the vomiting was attributed by the author entirely to the displacement of the uterus, and consequent pressure upon the pelvic parts. As soon as the pressure was permanently removed, by raising the body of the uterus out of the pelvic cavity, the vomiting and nausea instantly ceased. As soon as the vaginal tampons were at all displaced, so as to allow the body to prolapse or antevert, the nausea and vomiting would instantly return.

Dr. Roe advocates the induction of abortion in any case in which rectal alimentation becomes impracticable, and in which bromide and chloral fail to check the vomiting, provided no relief follow the rectification of any malposition of the uterus which may be present. In support of this procedure, he brings forward two series of cases observed by various authors—28 in which artificial abortion was not induced, and 20 which were terminated by artificial abortion. In the former the recoveries and deaths were equally balanced. In the latter series 16 recoveries occurred as against 4 deaths.

From the generally accepted fact that the so-called uncontrollable vomiting of pregnancy may be due to one or more causes acting singly or in conjunction one with another, and consequently calling for treatment, as disease or the pathological conditions on which it depends, it is much to be regretted that no mention is made of such highly important associated conditions as alcoholism, constipation, albuminuria, jaundice, and neurosis, a due appreciation of which is absolutely necessary before arriving at the necessity for the induction of abortion as a means of bringing not only the vomiting but also the pregnancy to an abrupt termination. The absence of a careful post-mortem report is likewise to be deplored in those cases which terminated fatally. The subject was lately somewhat fully discussed in the Obstetrical Society of London (*Obstetrical Transactions*, vol. xxvi. for 1884, pp. 273 *et seq.*), and our author might with advantage study the literature of the subject, which is large.

EXTRAUTERINE GESTATION; DEATH FROM RUPTURE.

At a meeting of the Brooklyn Pathological Society, held in October (*New York Medical Journal*, January 23, 1886), a specimen of tubo-uterine gestation was exhibited, in which death had resulted from rupture of the sac. The fœtus, estimated at two to three months, had escaped with a quantity of blood into the abdominal cavity. A corpus luteum was found in the right ovary, and gestation had taken place in the uterine extremity of the right tube. The inner (uterine) third of the wall of the sac was formed by the muscular wall of the uterus, the remainder by the dilated tube. The sac contained part of the membranes, some clotted blood, and a mass of chorionic villi. The rest of the membranes had protruded through a circular opening in the postero-external aspect of the sac. This opening was in great part surrounded by inverted edges, which were partially adherent to the protruded membranes. The fœtus had escaped through a rent at the outer aspect of the projecting membranes. The placenta was found attached high on the anterior uterine

wall, adjoining the opening between the uterine cavity and the sac. The membranes separated from it during extrusion from the sac. The mucous membrane of the cavity of the body of the uterus was thick, soft, and exfoliating. That of the cervix was congested, slightly thickened, but firmly adherent, and did not present the common arbor vitæ appearance.

A CASE OF EXTRAUTERINE PREGNANCY.

DR. G. R. ROBERTSON reports in the *British Medical Journal* for February 13, 1886, the following case: Lavinia B., æt. thirty-three, was the mother of two children, aged four and two years. On May 22, 1885, ten weeks after the last period, she was suddenly seized with severe pains in the lower part of the abdomen, followed by faintness and sickness. A second attack, more severe than the first, occurred a week later, but passed off in the course of a few days, and was followed by some distention and tenderness in the lower part of the abdomen. The uterus was somewhat enlarged, and on the left side, but quite separate from it, was found a tumor about the size and shape of an orange, "neither so smooth nor so hard as a fibroid, yielding to the pressure of the finger, but giving no sensation of fluidity." It seemed to be firmly fixed in the pelvis. During the attack it was tender on pressure. Throughout June and July the patient suffered frequently from colicky pains, and had two more attacks like the preceding, but less severe. On June 24, and again on the 30th, she had a show, but no membrane or solid substance was expelled. Meanwhile the tumor had been increasing steadily in size. Toward the end of July, however, it began to get smaller. On August 12, symptoms of intestinal obstruction set in, and stercoraceous vomiting followed. The tumor was quite immovable, and bulged more prominently into the pelvis, obstructing the large bowel. Enemata were ineffective. On August 14 the patient was chloroformed and placed in the lithotomy position. The tumor was reached by a left lateral incision through the perineum, and explored with the finger. It is noted that the opening was both contractile and dilatable. A portion of the placenta was recognized. The fœtus, apparently of about four months gestation, shrunk and macerated, was then found and removed by gentle traction on a foot. During the operation, well-marked labor pains were observed. The umbilical cord was divided and replaced in the sac after the removal of a small quantity of old blood-clot. Shortly after the introduction of a double drainage tube, alarming hemorrhage set in, probably from partial detachment of the placenta, which impinged on the opening. It was, however, soon controlled by hot water irrigation. The wound was packed with cotton, soaked in sublimate solution. On the following day the bowels acted freely; all symptoms of obstruction had disappeared. The sac was frequently irrigated with warm water. On August 22 the placenta was detached with the finger, and removed piecemeal. It was considerably larger than is usual in a four months' pregnancy. The sac was washed out with carbolic lotion (1 in 40). Recovery was uninterrupted. The temperature remained normal. On September 1 the patient was allowed to sit up in bed, and on September 6 was down stairs attending to her household duties. The wound speedily healed. On October 28 the patient had menstruated a fortnight previously in the usual way. There was some rigidity in the left fornix, and a cord-like hardness could be felt along the left vaginal

wall in the track of the wound. The uterus occupied the normal position, was movable, and in other respects free from disorder.

ON THE VALUE OF BRAXTON HICKS'S METHOD OF COMBINED VERSION
IN CASES OF INDUCED PREMATURE LABOR.

FEHLING, in the *Centralbl. f. Gyn.* for March 6, 1886, discusses the value of the above treatment in the troublesome cases in which premature labor has been induced, but in which pains are very feeble and inefficient. In many of these cases the child dies through want of oxygen, and extraction has to be done under circumstances rendered much more difficult by the delay. To avoid this, Fehling has adopted the following plan: After inducing premature labor, and encouraging the onset of pains by the usual methods, he turns the child by Braxton Hicks's combined internal and external version, with the object of bringing down a leg and thus obtaining a control over the extraction, should the latter become necessary. When version has thus been performed, and the breech brought down into the pelvis, pains frequently come on and labor advances rapidly; but if not, or if the heart sounds of the fœtus indicate that its life is endangered, extraction must be proceeded with.

Fehling thinks this procedure especially well suited for multiparæ, in whom uterine inertia under these circumstances is common. But in primiparæ and multiparæ, in whom strong pains come on and soon fix the presenting part in the brim, it is not so appropriate. Extraction should not follow immediately on version; it should be delayed till definite indications arise.

SPLITTING OF THE WHOLE URETHRA DURING LABOR.

KRUKENBERG relates an instance of the condition named above in the *Centralbl. f. Gyn.* for November 28, 1885.

Mrs. W., æt. twenty-eight, confined four times. First child (breech presentation) was born dead; in the second labor a living child was delivered with forceps; in the third a living child was born spontaneously. Post-partum periods normal. During the last confinement (May, 1885), the midwife, after rupture of the membranes, made the woman stand between two chairs, lean forward and rest her arms on the backs of the chairs. In this position the child was born spontaneously and alive. The labor was immediately followed by severe hemorrhage, which the midwife stopped by pressing her hand against the vulva. Since then the woman has had total incontinence of urine.

She applied for admission to the hospital on July 3, 1885, requesting to be operated on. Pelvis normal. The posterior wall of the urethra was found to be split throughout its whole length by a median longitudinal fissure, the smooth and thin edges of which lay in contact, so that no gap existed. Apart from a small, old cicatrix due to a perineal tear, no scars were visible either at the anterior or posterior vaginal wall. The mucous membrane of the urethra appeared normal. By gently pressing in the finger, the bladder was reached and found to be only about two and a half centimetres long, and to present trabeculæ but no diverticula. Uterus retroverted, not enlarged, movable; parametria free.

The operation needed was very simple: the edges of the tear were refreshed

and united by a suture. During the first eight days after the operation the bladder was drained according to Fritsch's method; the wound healed by first intention without any rise of temperature. From that time the patient was able to hold her water completely, though at first obliged (without any evidence of cystitis) to pass it every five minutes. Inasmuch as the bladder even artificially could only be filled to a very slight extent, the frequent micturition clearly depended not merely on the weakness of the sphincter, but on the slight power of distensibility possessed by the bladder. Krukenberg attempted to increase its capacity by washing out the cavity regularly, but on the 27th of July the patient left, satisfied with the improvement. At that time she made water about every twenty minutes.

Krukenberg states that this form of splitting is extremely rare, and unhappily, for want of details, he cannot say whether it was due to an abnormal position of the head, as occurred in a case published by Werth (*Arch. f. Gyn.*, xvi. p. 126), but he considers that in all probability the posterior urethral wall in his patient was unusually delicate, which may have been due to a slight degree of hypospadias.

RUPTURE OF THE UTERUS.

This case (*Lancet*, February 6, 1886, p. 268) formed the subject of a coroner's inquiry at Brighouse, in Yorkshire. The midwife in attendance found that the membranes had ruptured, and recognized an unusual presentation. According to her story, the patient was seized with a "sick fit," from which she never rallied. Whether forcible traction was made on the leg of the fœtus before or after this event is a point which is open to doubt. At any rate, the midwife allowed more than an hour to elapse before calling in medical aid. On reaching the house, Dr. Bond, the physician consulted, found the patient dead. At the post-mortem examination a rent twelve inches long was found in the uterus on the left side toward the front, and in that portion of the uterine wall which had impinged on the pubic bones there were extensive bruises extending through its whole thickness. It became a matter for consideration whether these bruises could have been produced by the uterus being driven against the pelvis by its own contraction, or whether it was not more likely that they were caused by forcible pulling on the leg of the fœtus.

A CASE OF CÆSAREAN SECTION, WITH REMARKS ON THE USE OF SILVER SUTURES.

SCHAUTA, in the *Wien. med. Woch.* for Jan. 9, 1886, relates a successful case of the above, in which mother and child were saved, and discusses the value of silver sutures for sewing up the uterus. The main features of the operation were the following:

J. R., æt. twenty-two, pelvis generally contracted, rickety, with a conjugate of six and a half centimetres (two and a half inches). The antiseptic system was carried out rigorously, and for eight days previous to the operation the air of the operating theatre was kept disinfected by a steam spray, consisting of a solution of corrosive sublimate (1:1000). The operation was performed as soon as the cervix had begun to dilate, and strong pains had set in. The abdominal incision measured eighteen centimetres (seven inches), and that

into the uterus nearly as much. The child was extracted without difficulty, nor did much hemorrhage follow the removal of the placenta and foetal membranes. An elastic band was tied round the cervix uteri at this stage, so as to check all bleeding, while the sutures were applied, and the cavity of the uterus washed out with a 1:2000 solution of corrosive sublimate.

Schauta used silver sutures for closing the uterine wound, these being inserted at intervals of about two centimetres (eight-tenths inch), and made to pass right through the uterine wall, though leaving the decidua free. No special treatment of the peritoneal lining was adopted, except that when the eight silver sutures which passed through the entire uterine wall had been dealt with by simply twisting them, twenty-nine sutures of the finest silk were used for bringing together the edges of the peritoneum.

When all these sutures had been inserted, the elastic band was removed from the cervix, and on slight bleeding showing itself between the edges of the wound, two more silver and five more silk sutures were added, ergotine being injected subcutaneously.

The patient did exceedingly well; her pulse never exceeded 120, and the highest temperature recorded was 38.9° C. (102° F.). Between six and seven weeks after the operation she was discharged well, and wrote afterward that menstruation returned in the natural way, and that her general health was excellent.

Schauta points out that the recent conservative Cæsarean sections have been very successful (ten recoveries out of fourteen cases), and he asks why they have been so much more successful than such operations were formerly. The antiseptic system rigorously followed has had, in his opinion, a large share in producing the result; yet even antiseptics cannot avert all the dangers associated with the operation, some of which dangers directly affect the peritoneum, while others are associated with septic lochial secretions, such as are discharged from the inner surface of the uterus, even in a normal puerperium. Schauta believes that it is only by accurately closing the uterine incision on the peritoneal side on the one hand, and on the side of the mucous membrane and its secretions on the other, and keeping the cut surfaces of the uterus in contact, that the dangers can be avoided.

A study of numerous cases of Cæsarean section in which the uterus has been sewn up has convinced Schauta that these conditions are only satisfied by silver sutures; that, next to the antiseptic system, it is the use of this kind of suture that has caused the recent diminution in mortality. This, and not a resection of the muscular tissue, or careful manipulation of the serous membrane, is the secret of success.

Amongst the most recent operations, Schauta finds eight in which silver and six in which silk sutures were used. Every one of the former recovered; while of the six latter, four died; results which show how much more successful are cases treated with silver.

Schauta next deals with the question as to how far resection of the muscular tissue and the various ways of treating the peritoneum contribute to the success of Cæsarean sections. He concludes that they have little influence, one way or the other; of far greater importance is the use of silver wire, instead of silk.

In trying to explain why silver sutures are so preferable, Schauta finds that

the former keep the two sides of the uterine incision firmly and securely together, while silk tends to cut its way through the tissues. Moreover, the silk suture constricts the tissue it encloses, very much in the way that an elastic ligature would do, and it is well known how much traction is required to bring the two sides together; while the silk cord passing from one side to the other invariably makes a more or less deep furrow, showing a considerable pressure on the enclosed tissues. Later on, the silk suture becomes softened, and it is then inefficient for its purpose. The action of a silver suture is very different. The two sides of the wound are held together with much less traction; the included tissues are less compressed; and, instead of the furrow mentioned above, the wire forms a gentle curve.

In conclusion, Schauta urges the use of the silver suture in all cases of conservative Cæsarean operation.

UNSUCCESSFUL CASE OF CÆSAREAN SECTION AFTER THE METHOD OF SÄNGER AND LEOPOLD.

MÜNSTER, in the *Centralbl. f. Gyn.* for Feb. 6, 1886, relates an unsuccessful case of Cæsarean section performed after the Säger-Leopold method. The operation was rendered necessary by a tumor which filled up the posterior half of the small pelvis, and the woman had been in labor for more than three days before applying for help. The first steps in the operation presented no special features. After removing the child with its placenta and membranes, Münster washed out the cavity of the uterus with a five per cent. carbolic lotion, and detached the serous lining from its subjacent tissue for a distance of one centimetre (four-tenths inch) along the entire length of the uterine wound, the two bands of peritoneum thus freed being reflected with forceps. A wedge-shaped margin (with its point toward the uterine cavity) of the muscular tissue was now cut away with a scalpel from both sides of the entire incision, after which the two flaps of serosa were so folded and brought together as to lie one against the other for the whole length of the wound. Ten deep sutures were passed through the whole muscular wall of the uterus, and then fifteen less deep or else superficial ones were inserted so as to bring the two layers of serosa accurately together. Carbolyzed silk was used for the sutures. The child was in a state of asphyxia when extracted, and could not be restored. The mother died four days after the operation. Post-mortem, both abdominal and uterine wounds were found well united, the sutures showing no signs of cutting their way out. The two strips of serosa were in good apposition.

Münster attributes the fatal issue to the fact that the Cæsarean section was postponed until the woman had been in labor for more than three days, that some hours had passed since the liquor amnii had been discharged, and that endometritis had already set in. The operation was done too late to be successful.

PORRO'S OPERATION; SURVIVAL OF MOTHER AND CHILD.

This operation was successfully performed in the Gynecological Clinique of Pavia, by Dr. Guzzoni degli Ancarani (*Lancet*, February 6, 1886). The patient was admitted at the eighth month of her seventh pregnancy, on June

10, 1884. She had suffered much from rickets in infancy. Her second pregnancy ended in abortion at three months, the first resulted in a living child at seven months, and the fourth in twins at the same period of gestation; the third, fifth, and sixth in living children at term. Five years had elapsed since the last confinement. The pelvis was so much deformed that the lower outlet barely admitted the examining finger. Labor pains commenced at 1 P. M. on July 22d. An incision eight inches long was made in the middle line, the uterus was brought out through the wound, and an elastic tube applied around the cervico-uterine cone (sul conocervico-uterino). After the fœtus had been extracted the elastic ligature was replaced by a wire one. Perchloride of iron was applied to the stump of the amputated uterus, and it was fixed with a strong needle passing below the metallic ligature. The wound was sutured with antiseptic silk, and styptic colloid applied to the edges. The operation, which was performed with strict antiseptic precautions, lasted a little over an hour. The child, a male, was living. All the sutures were removed on the seventh and eighth days. Convalescence was uneventful. The patient was in fairly good health a year afterward.

WHEN SHOULD THE UMBILICAL CORD BE TIED?

The *Wien. med. Woch.*, December 19, 1885, summarizes Engel's investigations on this subject. Engel recommends late tying of the cord, for when this practice is followed the newborn child receives as much as a quarter, or even a third more blood than its body would otherwise contain. Moreover, it is quieter, does not begin to drink so soon, and is more sleepy. Engel also finds that the plan of ligaturing late greatly improves the prospects of life of the newborn child.

Out of 90 cases of premature birth in which the cord was tied immediately after delivery, 18.88 per cent. died during the first 10 days, while out of 74 similar births in which the cord was ligatured late, only 9.45 per cent. died. Syphilitic fœtuses and those weighing more than 3 kilos (6½ pounds) were not counted.

This transfusion of blood where late ligature is practised is not due to thoracic aspiration or to uterine contractions, but to the cardiac activity of the fœtus and to the contractility of the umbilical vessels. When the cord gets quite cold the arteries in it, owing to their marked contractility, become greatly narrowed and prevent any blood continuing to flow out of the child, while the blood continues to enter the body of the child by means of the less contractile umbilical vein.

THE ETIOLOGY OF ISCHURIA DURING THE POST-PARTUM PERIOD, AND AFTER THE REMOVAL OR TAPPING OF LARGE ABDOMINAL TUMORS, WITH SOME REMARKS ON MICTURITION IN GENERAL.

SCHWARZ, in the *Zeitsch. f. Geb. u. Gyn.* for 1886, differs from most authors in his opinion regarding the causes of the ischuria seen in the conditions mentioned above.

Olshausen, for instance, believes that the ischuria after parturition is due to urethral obstruction. He supposes that the urethra is elongated when the bladder and uterus rise up into the abdomen during pregnancy, and that

when the organs return to their usual situation, a bend takes place in the urethra which causes sufficient obstruction to bring on retention.

Schröder, on the other hand, supposes these cases of retention to be due to the capacity of the bladder having been increased during the growth of the pregnant uterus, or other tumor, as the case may be, which increased capacity enables the urine to be retained for longer periods than before, and gives rise to a pseudo-ischuria.

Schwarz believes there is a further cause at work which may explain the inability to micturate which undoubtedly exists, as well as the diminished desire to make water. This he finds in the fall of the intra-abdominal pressure which must accompany the termination of labor, or the surgical removal of large intra-abdominal masses, a fall which lasts for a considerable time if the horizontal dorsal posture is maintained.

As regards the mechanism of micturition in general, Schwarz arrives at conclusions which are at variance with those usually accepted. According to the latter, urine is expelled from the bladder by the active voluntary or reflex contraction of its muscular walls, the coöperation of the intra-abdominal pressure being unnecessary, or, at most, of secondary importance. Schwarz, on the contrary, holds that it is not by contraction of the muscular walls of the bladder that the urine is expelled, but by the action of the intra-abdominal pressure on the distended bladder. That pressure is increased when the abdominal muscles are thrown into action, and when certain postures—*e. g.*, the erect—are assumed, and when that increased pressure is brought to bear on the walls of the bladder, urine is expelled. He denies that the contractions of the muscular walls of the bladder are under the control of the will, and even when they contract in a reflex manner, as when a few drops of urine have escaped from the neck of the bladder, they are unable to expel the whole or even a large part of the urine.

The sphincter at the neck of the bladder, however, does seem under the control of the will, though it may also act in a reflex manner. Voluntary micturition, therefore, according to Schwarz, takes place as follows: When, under the influence of the will or in a reflex manner, the sphincter vesicæ is relaxed, urine will flow out much as during catheterization, since the whole bladder, except its lower wall, is exposed to the intra-abdominal pressure. The greater this pressure, the greater the rapidity and force of the issuing stream. The walls of the bladder, however, remain quite lax, their retraction being a consequence, not a cause, of micturition. According to this view, the musculo-elastic walls of the bladder have merely the function of enabling the organ to undergo great distention, and again to contract after evacuation.

If the intra-abdominal pressure acting upon the bladder is very slight, and for some reason or other cannot be increased, micturition becomes difficult. Such conditions are met with in women recently confined, or after laparotomies,appings of the abdomen, etc.—the dorsal recumbent posture alone is sometimes sufficient. The ischuria seen in diseases and injuries of the central nervous system, according to this view, is due, not to paralysis of the detrusor urinæ, but to an inability to open the sphincter and to raise the intra-abdominal pressure to a sufficiently high level.

Schwarz then describes some manometric experiments which he made with the object of estimating the intra-abdominal pressure. He connected the

urethra with a manometer, and was able to show that the pressure in the abdominal cavity was much as if the latter had been filled with water—in other words, any part of the abdominal cavity is under a pressure which may be represented by a column of water of which the height corresponds to the vertical distance of that part to the point which is highest in the abdominal cavity. Hence it follows that the pressure will always be greatest at those parts of the abdominal cavity which lie lowest, and *vice versa*.

Further corroboration of this view as to the influence of the intra-abdominal pressure on micturition is given by others. Thus Schultze states that in a living woman the bladder, when empty, does not assume a globular shape, but that the walls become applied to one another, the upper one sinking into the lower, so as to produce a goblet-shaped organ. This, according to Schwarz, shows that the bladder is not emptied by an active contraction of its walls, for, if it were, it would become more or less globular. Again, if during laparotomy the distended bladder is emptied by a catheter, the vertex of the bladder can actually be seen to sink deeper and deeper, and at last rests in the lower infundibular half; no ball-like contraction takes place; the parietes remain loose and can be stretched in any direction. Again, women with a vaginal cystocele are only able (unless the cystocele is replaceable) to empty that part of the bladder which is still *in situ*, since the prolapsed portion is withdrawn from the influence of the intra-abdominal pressure. If the bladder becomes spherical on evacuation, the cystocele would become replaced and the whole of the urine would be expelled. But Schwarz finds the strongest evidence for his views in the following experiment: Two water manometers are used, one communicating with the moderately filled bladder, the other with the rectum. The tube passing to the rectum must be inserted at least as far as the descending colon, the intestine having been previously emptied of hard feces and moderately distended with water. When the patient is at perfect rest, whether erect, sitting, or lying, both manometers will stand at the same height; but if he is now told to attempt to make water, two things may be noticed: first, that if a somewhat small catheter had been used to connect the bladder with its manometer, some drops of urine will escape by the side of the catheter, showing that the sphincter vesicæ has relaxed; secondly, that the two manometers will be seen to rise to an equal height. Schwarz argues that if the efforts at evacuation caused an active contraction of the walls of the bladder, the manometer connected with it would indicate a greater pressure than that connected with the rectum, while, as a matter of fact, they remain at the same level, both during and apart from straining efforts.

Ischuria, therefore, in the conditions under discussion, may be due to a deficiency in the intra-abdominal pressure which is necessary to expel urine.

THE TEMPERATURE OF THE MAMMARY GLAND DURING THE PUERPERIUM.

The *Centralbl. f. Gyn.* for January 16, 1886, gives an abstract of investigations by NEGRI on the above. A surface thermometer was laid on one breast at the same time that an ordinary maximum thermometer was lying in the corresponding axilla. Negri found the temperature of the mammary gland to be higher post-partum than in pregnancy or the non-gravid state, though

never higher than that of the axilla, and only in exceptional cases as high; the usual limits met with were 34° C. (93° F.) and 37° C. (98.5° F.), and only in rare cases was the latter exceeded. The more abundant the lacteal secretion, the higher the temperature, a persistently high temperature indicating a copious milk supply.

THE PROPHYLAXIS OF PENDULOUS ABDOMEN IN WOMEN.

CZERNY, in *Centralbl. f. Gyn.* for 1886, No. 3, compares the tense and elastic condition of the abdominal walls of many English multiparæ with the pendulous abdomen of Germans, and ascribes it to the fact that, at any rate in the upper classes in England, it is the custom for the accoucheur immediately after the completion of labor to apply a broad binder firmly to the abdomen of the parturient woman, which binder is generally worn for eight days. Czerny thinks it possible that such a binder applied at a time when important plastic and nutritive changes are taking place, may have a considerable influence in restoring the tense and elastic condition of the abdominal walls which existed previous to pregnancy. There is some reason for supposing that it was formerly the custom in Germany to apply such a binder, but now it has fallen almost entirely into disuse. Czerny recommends that accoucheurs and midwives be taught immediately on the conclusion of labor to apply a broad binder round the lower abdomen, as a prophylactic measure against "pendulous abdomen."

THE MEDICO-LEGAL IMPORTANCE OF HÆMATOMA OF THE STERNO-MASTOID IN NEWBORN CHILDREN.

KÜSTNER, in *Centralbl. f. Gyn.*, No. 9, 1886, discusses the mode of origin of hæmatomata in the sterno-mastoid muscles of newborn children, and combats the view that they are always due to the muscles having been exposed to excessive traction. He relates a case of labor with breech presentation, in which no assistance of any kind was afforded—even the usual plan of supporting the trunk during the delivery of the head was not adopted—and yet a hæmatoma appeared in the left sterno-mastoid. Küstner infers that these swellings may occur even when a labor runs a perfectly natural course.

Küstner also records some experiments made on stillborn fetuses in which a row of pegs was inserted into the sterno-mastoid, and the neck stretched and rotated in various directions. He found that neither lateral flexion nor stretching of the neck had much effect in stretching the sterno-mastoid, and causing the pegs to separate; but torsion of the neck did so readily, especially when the face was twisted toward the side under observation. Küstner believes that a similar movement during labor is the cause of hæmatomata, for torsions of the neck are well known to be of frequent occurrence, even in the ordinary mechanism of parturition.

Küstner admits that hæmatomata are by no means uncommon in forceps extractions, but he believes that even in these cases they are mainly due to the twisting of the neck which is associated with such labors, though the pressure of the forceps may assist in the causation.

Küstner sums up his conclusions as follows:

1. Hæmatoma of the sterno-mastoid is caused, not by stretching or extension, but by twisting of the neck.

2. Since the neck may be greatly twisted even in spontaneous delivery, a hæmatoma may arise in simple cases both of vertex and of breech presentation.

3. The occurrence of a hæmatoma therefore does not prove that criminal or instrumental violence has been resorted to.

GYNECOLOGY.

SHOCK, ITS RELATION TO DISEASES OF THE ORGANS OF CIRCULATION IN ABDOMINAL TUMORS.

It has frequently been pointed out that women suffering from abdominal tumors are exposed to dangers (independent of those directly connected with the new growth) brought on by simultaneous changes in other organs; and numerous deaths, especially after operations, have occurred in which the post-mortem examination revealed no other cause of death than those changes.

In earlier times, when the term "shock" was a very comprehensive one, all these fatal cases were classed under it, but in 1883 Wernich drew attention to the fact that death is now much less frequently ascribed to shock, since pathology has made such rapid strides, and we now regularly look for definite anatomical changes in organs, especially in the heart.

Indeed Wernich believes that in the future still fewer deaths will be ascribed simply to neuro-paralysis, and a review of numerous published cases, as well as those we have collected, confirm this belief.

The perils referred to, which affect women suffering from large abdominal tumors are various, but mainly related to the organs of respiration and circulation. Partly on account of the growth of a very large tumor, partly on account of the prolonged interference with respiration and circulation, a sort of marasmus sets in, which is characterized by general emaciation, and the well-known facies ovarica. Moreover, a deterioration of individual organs takes place, especially of the heart, which, from being badly nourished, and called upon to do extra work, is often unable to meet the demands made upon it.

Dangers of another kind are due to the fact that, in most of these tumors (especially in fibroids with very large veins), thrombi form which may be easily detached, and cause immediate death by pulmonary embolism, or, at least, lead to a condition of great danger. Schwarz has published two such fatal cases in which numerous emboli in both lungs were formed.

HOFMEIER (*Zeitsch. für Geb. und Gyn.*, xi. S. 366) recently had the same experience, except that the tumor was an ovarian one. For purposes of examination the patient was put under chloroform, and apparently she bore it well. But the next day, when she attempted to get up to have the bed made, intense dyspnœa set in, leading to immediate death. On the post-mortem table numerous pulmonary emboli were found. He had seen another case in which similar symptoms supervened, though happily they did not prove fatal.

It appears that the formation of these dangerous thrombi is especially fre-

quent after removal of the ovaries. Dohrn, on the other hand, has published four cases of uterine fibroid in which death occurred, once before, three times after the operation; in all of them pulmonary embolism was the cause.

The heart, however, is the organ generally affected. Quite recently, Säger and others have pointed out how seriously secondary changes in the muscular structure of the heart affect the prognosis of operations. Amongst the cases operated on by Schröder I have seen illustrations of this, and those especially are of interest in which death took place before the operation, inasmuch as all doubt as to the operation being the cause is excluded.

The cardiac degenerations are not always due to pathological growths in the abdomen; they may be due to physiological changes; indeed, they are not uncommon accompaniments of pregnancy, and quite distinct from the brown cardiac atrophy so frequently met with in lying-in women who have died from septicæmia. Hofmeier has met with several such cases, of which one may serve as an illustration.

"Mrs. L., a robust, strong woman, confined June, 1884. Her pelvis was occupied by a tumor as large as a fetal head, which had to be pushed up into the great pelvis to allow the head to enter the brim. Labor went on naturally till near the end of the second stage, when the low forceps operation was used to extract the head, owing to the feebleness of the pains. After removal of the placenta, moderately free hemorrhage set in (due to an atonic condition of the uterus), which, however, was finally stopped. Two hours after she had a pulse of 80 to 150, and looked as if sinking; nine hours after the end of labor she died in spite of the use of restoratives. Death was attributed to internal hemorrhage, but none could be found post-mortem. The tumor proved to be a pedunculated fibroid. The heart was not specially flabby, but it had undergone brown degeneration."

In this, as in most other cases, death was most likely due to a combination of causes; in other words, a hemorrhage which would not be dangerous in an otherwise healthy woman may be so, and even lead to a fatal termination when cardiac weakness due to brown degeneration of its muscular tissue is superadded.

In all, Hofmeier has seen 19 cases of sudden unexpected death with pathological and physiological swellings of the abdomen, caused by, or at any rate accompanied by, secondary changes which, in part at least, were certainly brought on by the swellings. They consisted in one case of pulmonary embolism consequent on thrombosis in a tumor in the broad ligament, 3 (2 fibroids, 1 ovarian cyst) due to extreme fatty degeneration of the cardiac muscle, 15 (5 ovarian, 4 uterine fibroids, 1 of fibroma of the pelvic connective tissue, 5 puerperal cases) due to the so-called brown atrophy of the heart's muscular tissue; 5 died before operation, 9 after; 5 after confinement. In reference to the question whether the cardiac complications are consequences of the new growths or accidental complications, he believes that a direct connection exists between the abdominal tumors and the cardiac changes. One other practical point remains; can we make a sufficiently early diagnosis to avoid such catastrophies? He believes that in cases of fatty degeneration we can; well-marked symptoms are present—weak cardiac action, general debility, shortness of breath, etc. It is otherwise, however, with brown atrophy; no special clinical symptoms show themselves, and frequently there is nothing

to call attention to the heart. It is not even always found in persons who have become feeble and cachectic, so that the practitioner may at any time be brought face to face with this disastrous complication.

In the discussion which followed Hofmeister's paper, various speakers emphasized the fact that these cases have nothing in common with shock in the proper acceptation of the word.

DIABETES IN RELATION TO THE UTERINE LIFE, MENSTRUATION, AND PREGNANCY.

DR. LÉCORCHÉ, in a paper in the *Annales de Gynécologie*, for October, 1885, discusses this subject under the following heads:

1. *The influence of the uterine functions on the development of diabetes.* Diabetes may occur in a woman at any period of life, but it seems to have a special tendency to do so in the premenstrual period, and after the menopause. To a certain extent the existence of the catamenia militates against the invasion of diabetes, and the earlier the menopause the greater the liability to early attacks of the disease. The gravity of the affection varies inversely with the age of the patient, and in attacks occurring during premenstrual life the ravages of diabetes are seen at their worst.

2. *Morbid states of the genital apparatus in diabetes.* In a woman who is still regular, diabetes causes disturbances in the working of the utero-ovarian system, but before inquiring into these functional derangements, it will be well to study for a time the morbid anatomy and local lesions of the genital apparatus.

- a. *Vulvar eczema.* Of these lesions eczema is by far the most frequent; it was present in nearly a third of the cases observed, and in the majority of these cases the patient was of a somewhat advanced age. As a rule, vulvar eczema is regarded as an early manifestation of diabetes, but close investigation will reveal that other symptoms of the disease have been present three or four years before the cutaneous affection; it is true that this eczema is usually indicative of an intense form of the disease. In searching out the causes of this eczema, it is important to note the constitutional tendencies of the patient; in many cases patches of eczema are found on other parts of the body, showing a leaning toward cutaneous disorders; at the genital part, however, there can be no doubt that the eczema is due to the irritating action of the fermentation which occurs in the saccharine solution; scrapings from the inflamed surface show the presence of spores and other evidences of fermentative action. The principal symptoms of diabetic vulvar eczema are three in number, viz., pruritus, the eruption itself, and a somewhat copious oozing. The first of these is the earliest symptom; it often precedes the eruption for a considerable time, does much to break down the patient's health, resists treatment very obstinately, but undergoes remissions and exacerbations in proportion to the intensity of the glycosuria. The eczema starting from those parts most in contact with the urine—*e. g.*, labia minora, spreads outward, and is often of a very severe type; it is not infrequently complicated with vaginitis, granular erosion of the cervix, urethritis with frequent micturition, furuncles, and nervous affections, such as migraine, gas-tralgia, and various neuralgias, of which sciatica is the most notable.

b. Granular metritis; granulations and alterations of the cervix. Vulvar eczema and granular inflammation of the cervix often coexist; in many cases it is evident that the inflammatory process has travelled along the vagina to the uterine mucous membranes, but in other cases no vulvar disease exists, and the uterine disease can only be ascribed to the morbid state of the blood, and the vicious influence thus exerted on nutrition. Confirmation of the above statement is given by the fact, that granulations of the pharynx or recurrent bronchitis not infrequently accompany the uterine disorder, thus signifying that in these cases the mucous tracts suffer, as the skin does in those where the vulvar eczema is the prominent feature. No definite relation between the severity of the glycosuria and the uterine disease has as yet been shown to exist; the granulations of the cervix may run on to extensive ulceration, and the persistence of this latter, together with the failure of all treatment, will often give a clew to the existence of diabetes.

c. Other uterine lesions. Diabetes is no bar to the existence of any lesion connected with the utero-ovarian system. Fungous metritis and attacks of ovaritis seem at times associated with the presence of glycosuria.

3. Influence of diabetes on menstruation. When diabetes occurs in the course of the menstrual life, it rarely fails to exert an influence more or less marked on the uterine functions. At times the courses are simply irregular, at others attended with great pain, in some cases they cease for months, to reappear as the disease abates, or, again, the menopause may be induced prematurely. Occasionally in diabetic women, metrorrhagia is observed, but in such cases some marked disease of the womb may usually be found to account for the abnormal loss of blood; at any rate, till such lesions are carefully excluded, the metrorrhagia must not be attributed to the blood condition.

4. Influence of diabetes on pregnancy and parturition. According to some authors, sterility should be the rule in diabetic women; although this is to a certain degree true, yet the rule must be in no wise considered absolute; in a number of cases observed a fair proportion became pregnant, and in one instance the existence of diabetes in both husband and wife was no bar to conception. Of course, in estimating the influence of glycosuria on conception one ought to take into account the uterine morbid conditions which may accompany diabetes. There is little doubt that diabetes does not materially affect the course of pregnancy and parturition, but the same cannot be said of its influence on the products of conception; the existence of diabetes in the mother seems to exert a serious influence on the child, to alter its nutrition, to shorten its life, or to develop vices of development which are scarcely compatible with life; in two out of four observations hydrocephalus was noted. The observations of Matthews Duncan confirm the above statements; no record is given of diabetes being recognized in the fœtus; according to the last named author, childbirth has a baneful effect on women suffering from glycosuria; in about seventy per cent. death ensued within a short period after delivery.

5. Effect of pregnancy on diabetes. According to the conclusions obtained by Dr. Matthews Duncan, pregnancy aggravates almost unfailingly the prognosis of diabetes, and the observations on which the paper is founded, show, without doubt, that glycosuria increases in intensity after delivery; an attempt has been made to discover whether any relation exists between the

appearance of sugar in the urine of suckling women (as occurs at times normally after delivery) and the exacerbation of glycosuria observed in diabetic women after parturition, but at present without success. In some cases it has been noted that the sugar has disappeared entirely from the urine of diabetic patients several days after labor, only, however, to reappear in greater amount in the course of a few weeks; in a similar manner, after the menstrual epochs, the sugar is materially lessened, but returns to its previous proportions or even to greater in a few days. Whatever the temporary effect of either menstruation or delivery may be in lessening glycosuria, the final effect in causing rapid augmentation of the disease must never be lost sight of.

THE SIGNIFICANCE AND DIAGNOSIS OF GONORRHOEA IN WOMEN.

The *Deutsche med. Wöch.*, Oct. 22, 1885, contains a paper by LOMER on this subject. Gonorrhœa plays a much more important part in gynecology than is generally admitted. As a cause of disease, it ranks next to the puerperium, and is at the bottom of a large proportion of the numerous cases of pathological exudations, perimetritis, fixed displacements of the uterus, cervical catarrh, erosions, and sterility which the gynecologist meets with.

The usually accepted view is due to the fact that gonorrhœa in women is often not diagnosed. Not only may the patient be unaware that she is diseased, but there may be no obvious physical changes to enable even the physician to arrive at a diagnosis. The disease may exist without any discharge or any scalding during micturition, or even any evidence of vaginitis, for in many cases the morbid condition is localized in the cervix.

Lomer has seen many cases in which gonorrhœa, proved to be such by its contagiousness, gave rise to none of the ordinary symptoms, but was confined to the cervical canal. Examination of the cervical secretion, however, showed the characteristic gonococci of Neisser enclosed in the pus cells.

He quotes some interesting researches by Bumm, in which the latter asserts that gonorrhœa in women most frequently affects the cervix, owing to the cylindrical epithelium of that region offering the best pabulum to the gonococci; while the latter find it difficult to penetrate the squamous epithelium (wrongly called mucous membrane) lining the vagina. Bumm, moreover, holds that gonorrhœal vaginitis is generally due to the cervical secretions causing irritation and inflammation of the vagina much in the same way as in gonorrhœa in the male the glans and foreskin may become inflamed through want of cleanliness.

If it is true that cervical gonorrhœa may exist without the vagina being necessarily involved, it is easy to explain why so many cases of gonorrhœa in women are not diagnosed; why so many apparently latent cases prove to be contagious; how Ricord came to the conclusion that any vaginal secretion might attain the virulence of true gonorrhœal discharges. Lastly, it would show that Noeggerath was to some extent right in his theory of latent gonorrhœa.

Lomer examined the discharges in numerous cases of purulent gonorrhœa, with a view to discover Neisser's diplococci. In men their detection proved easy. In women, however, he found it quite otherwise, for so many other microorganisms were present that the true cocci of Neisser could only be made out with great difficulty. Some observers have stated that true gono-

cocci can be recognized by their shape and by the colonies they form; but this is questionable. Moreover, Bumm met with several kinds of diplococci so much like the true gonococci as to induce him to call them pseudogonococci. They differ from the true, first, by not occurring within pus corpuscles; secondly, by forming irregular groups, and not rounded colonies like true gonococci. Lomer, however, was not able to satisfy himself as to these differences.

He next attempted to find some characteristic color reaction, which might serve for the diagnosis of gonococci; but this, also, he failed to do.

He examined the vaginal secretions of eighty-two hospital out-patients suffering from acute and granular vaginitis, urethritis, cervical catarrhs, perimetritis, etc., in whom there was ground for suspecting previous gonorrhœal contagion, with a view of finding gonococci; but they could only be made out in seven and a half per cent. of all the cases. He concludes, therefore, that vaginal secretions are of very little value for the detection of gonococci. When, however, he examined cases of suspicious cervical mucus in the same way, he found gonococci in all of them (five cases).

Gonococci are generally considered to be pus corpuscles enclosing diplococci. But Lomer considers that even this fact is open to doubt, for exactly similar cocci occur in the lochia between the second and sixth days.

Lomer arrives at the following conclusions:

1. Vaginal secretions are unsuited for the detection of gonococci.
2. The latter should be sought for in the cervical secretions.
3. Only such cases should be looked upon as gonorrhœal in which diplococci are found enclosed in pus cells.
4. It is not as yet justifiable to regard such diplococci as proving the existence of gonorrhœa with absolute certainty, since they occur in the mild vaginitis of children, and colonies of them are often found in lying-in women.

In the diagnosis of gonorrhœa, clinical symptoms are also of value. The virulent affections of the vulva, urethra, and vagina are of diagnostic importance, whether they be due directly to contagion, or caused by the irritating cervical secretions. Till lately, pointed condylomata and inflammation of Cowper's glands were looked upon as pathognomonic, but this is no longer quite so certain.

Purulent cervical catarrhs and erosions are also very suspicious, though gonococci have also been found in the transparent cervical discharge.

Gonorrhœa is a frequent cause of sterility, probably on account of the associated endometritis and tubal catarrh.

Again, scanty menstruation is often secondary to gonorrhœa, and may amount almost to amenorrhœa.

As a last help in diagnosing gonorrhœa in a woman, the history of the husband should be inquired into.

Lomer considers that, apart from microscopical characters, there is abundance of evidence for establishing a diagnosis of gonorrhœa.

ON THE PALPATION OF PELVIC ORGANS.

SCHULTZE, in the *Centralbl. f. Gyn.* for Oct. 24, 1885, records some further investigations on the palpation of intrapelvic muscles. He thinks it im-

portant for several reasons, that the gynecologist be able to recognize the sometimes contracted, sometimes relaxed, body of the psoas muscle. For instance, it affords a good means of finding the ovary in bimanual examinations. Again, sensitiveness to pressure along the inner edge of the psoas where the spermatic vessels cross the posterior pelvic wall, not unfrequently accompanies ovaritis, and long after the termination of parametric affections. Schultze has, moreover, known cases in which the persistently contracted body of the psoas was mistaken for a morbid growth.

When this muscle is relaxed, it is so soft that the exploring hand feels the pelvic wall while scarcely conscious of the muscle offering any resistance; but if the thigh is forcibly flexed, the pelvic wall can no longer be felt; instead of it, the finger comes upon the somewhat sensitive body of the muscle, forming a hard mass lying in front of the posterior pelvic wall.

There are two other small muscles which may be of help in explorations of the pelvis per vaginam, but which may mislead the inexperienced—the obturator internus and the pyriformis. The obturator internus is usually a well-developed muscle lying against the antero-lateral wall of the pelvis, and presenting a broad, firm swelling to the exploring finger, as soon as the thigh is forcibly rotated outward; extension and adduction of the thigh also cause it to contract. The portion arising close to the foramen ovale can be distinctly felt per vaginam, and also that stretching up along the anterior wall of the great ischiatic notch. The body of the muscle, when contracted, is rarely sensitive to pressure; but if the obturator nerve is pressed as it runs in the sulcus obturatorius between the muscular fibres, a cramplike pain may be felt in the thighs.

The pyriformis is most accessible in small women with a low pelvis; when the uterus is high, as in advanced pregnancy, the finger can reach above its upper edge.

So far as the evidence from palpation goes, this muscle seems to be very unequally developed in different persons; nor is it thrown so regularly into action (as the above) when the thigh is rotated outward. On the other hand, it may remain contracted, though the patient is told to lie quite loose. Pressure on the contracted body of the muscle may be very painful, possibly owing to such pressure being transmitted to the sacral nerves. All these characters may be the source of error. Schultze himself has mistaken the pyriformis for ovaries adherent to the posterior pelvic wall.

The obturator is not very likely to be mistaken for a tumor, since its surface forms a gentle convexity. But the pyriformis when well developed rises steeply from the anterior surface of the sacrum to the height of sometimes two centimetres (0.8 inch), while there is a space of about three centimetres (1.2 inch) between the two muscles. Two fingers, the tips of which are placed on the sacrum, can simultaneously feel the two pyriformes contracting or relaxing, and this is a great help in the diagnosis. The mere fact of telling a patient who is lying loosely to stiffen her thighs, is often enough to throw the pyriformes into action. The recognition of this contraction and relaxation will prevent any risk of mistaking this muscle for a tumor.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

UNDER THE CHARGE OF

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LUNG TEST IN INFANTICIDE.

SOMMER, of Dorpat (*Viertelj. f. gericht. Med.*, Bd. xliii. S. 253-260), furnishes a contribution to the controversy which has been carried on for over three years, as to the effect of Schultze's method of artificial respiration on the reliability of the hydrostatic lung test in cases of infanticide. It will be remembered that, in 1883, Runge called attention to the fact that Schultze's method of swinging the child was not only efficient in causing apparently dead newborn children to respire, but was also capable of more or less distending the lungs of really stillborn children; and he therefore urged the importance of bearing this in mind in cases of alleged infanticide. The possibility of such inflation being produced in the dead child by Schultze's method—whereas it is well known that all previous methods of artificial respiration have failed to produce such an effect—is, apart from actual direct experimentation on the dead, rendered more likely since Torggler has recently shown, by a series of careful experiments (*Wien. medic. Bl.*, 1885, Nos. 8-10), that Schultze's method is of all methods of artificial respiration the most certain in restoring newborn children. Direct experiment on the dead is attended with difficulty, since it is in the great majority of cases difficult to prove that the inflation of the lung was not produced by some unobserved inspiration during or after the birth of the child. Hence so eminent an authority, as Hofmann, of Vienna, maintains that the air found by Runge and others in the lungs of stillborn children, after manipulation by Schultze's method, has really entered the lungs before, and is the result of aborted natural respiration. He himself has made the experiment with absolutely stillborn children, but found no air in the lungs. It is alleged, however, by Runge, and those who agree with him, that the children with which Hofmann made his experiments were not full-grown fœtuses, and that immature fœtuses (eight months and under) are known not to have their lungs affected by Schultze's method. This allegation appears to be borne out by a reference to the children operated on by Hofmann.

Prof. Schauta has written a paper in which he supports Runge; while, in a still more recent paper, Dr. Nobiling takes the side of Hofmann. Sommer, who is Runge's assistant, now takes up the pen in defence of his chief, and produces the protocols of two cases in Runge's clinic which appear to place it beyond doubt that Schultze's method is capable of more or less inflating the lungs of stillborn children so as to simulate respiration. Both children—one of which was a twin—were mature, or nearly mature, and both were ascertained by auscultation, and otherwise, to have been alive to within a short time of the completion of their delivery, previous to which they were with great certainty ascertained to have died, and before there was any possibility

of their having breathed—in one case before the membranes had ruptured. In each case the child was swung thirty times, according to Schultze's method. On opening the chest, the lungs in both children were found to be distended and mottled; and although they did not swim in water when attached to the thymus and the heart, they floated readily by themselves, as did also the greater number of small pieces into which the lungs were divided. The only uninflated portions were toward the base of the lungs. This confirmation of Runge's results is becoming the more important, since nurses are now being trained in several parts of the world in the practice of Schultze's method of artificial respiration. It adds a new difficulty to the many difficulties attending the medico-legal investigation of cases of alleged infanticide.

STATE OF THE PUPIL AFTER DEATH.

DR. J. N. MARSHALL, of Glasgow, has contributed to the *Lancet* (August 15, 1885, pp. 286–288) a paper on the changes which take place in the pupil after death, and the action of certain poisons on the dead eye. He concludes, from a tolerably large number of observations, that the pupils generally dilate immediately previous to death, even though they may have been previously much contracted, as, *e. g.*, in cases of opium-poisoning. Further, that in the majority of cases the pupil within an hour after death begins again to contract gradually, and goes on contracting for about forty-eight hours. This contraction, which is considerable (*e. g.*, 7.2 mm. to 4.6 or 3.8 mm.), is independent of the action of light, or of rigor mortis. Atropine, when dropped on the eye, after death, causes slight dilatation. The eye retains its susceptibility to the action of atropine for about four hours after death. [The conclusion for medico-legal purposes evidently remains as it was, viz., that no value can be attached to the state of the pupil at or after death as an indication of the mode of death.—REP.]

DIFFERENT PUTREFACTIVE APPEARANCES IN THE CORPSES OF TWO INDIVIDUALS WHO DIED UNDER EXACTLY SIMILAR CIRCUMSTANCES.

MEYER, of Heilsberg (*Viertelj. f. gerichtl. Med.*, N. F., Bd. xlv. S. 101–103, 1886), describes the case of a man and his wife, aged seventy-two and sixty-five, respectively, who were found dead in bed, apparently having died from carbonic oxide poisoning. The stove in the small room had its damper closed. The man had been a drunkard, and the woman had suffered for many years from bronchitis. The bodies of both were seen by Meyer about thirty-six hours after the supposed period of death, and they were found to present the appearances characteristic of death by carbonic oxide—bright red spots on the surface, and a bright red color of the blood, which, when tested, was found to contain carbonic oxide. But, although the bodies were dead from the same cause, had died probably about the same time, were about equally developed and nourished, and had lain in bed under exactly the same conditions, yet they presented within thirty-six hours a remarkable difference in the degree of putrefaction. The corpse of the woman was perfectly fresh, had no putrefactive odor, and was not discolored except over the abdomen, where there was a slight greenish discoloration. That of the man, on the contrary, was considerably putrefied; the subcutaneous tissue was greatly distended

with putrid gases, rendering the individual almost unrecognizable; the face was greatly swollen, the penis was of the thickness of a child's arm, and the scrotum was as large as a child's head. The skin was much discolored; on the head it was greenish-red; on the back, upper arms, and thighs, it was distinctly green. The veins showed through the skin as dirty brownish-red streaks. The epidermis was in many parts blistered, rigor mortis had entirely disappeared, and the putrefactive odor was very strong. Eight days later, the putrefactive appearances had not much altered in the woman. In the man, they had become still more marked. Meyer concludes with the remark that, when he first saw the corpses—that is, thirty-six hours after death—the putrefactive appearances were such as might have led him to infer that the woman had been dead for twenty-four to thirty-six hours, but that the man had been dead for fourteen to twenty days. Yet both were seen alive by their neighbors on the night previous to the accident.

SULPHURETTED HYDROGEN.

BROUARDEL and LOYE (*La France Médicale*, Sept. 5, 1885) have made a number of experiments on tracheotomized dogs with sulphuretted hydrogen, the animals being poisoned by the inhalation of a half or a two per cent. mixture of the gas with air. The stronger mixture killed a dog in two or three minutes, the weaker in seventeen to fifty minutes. The observers believe that, in the former case, death is due to the direct action of the gas on the nervous centres; whereas, in the latter, this action is aided by asphyxia. In both, the pupil dilates, and is insensible to light, and the cornea is insensitve; but, after awhile, if the dilute mixture is being inhaled, the sensitiveness of the cornea returns. In this case also the respiratory movements at first cease and then begin again, and gradually increase in amplitude, although with lessening frequency, until death ensues. Under the more concentrated poison, respiration quickly ceases, and with it all reflex movements. The blood coagulates readily, and has a violet color in thin layers. It contains a fair amount of oxygen.

PTOMAINES.

Among the recent numerous contributions to our knowledge of the poisonous action of diseased or putrid flesh, the following are worthy of notice:

LEHNERT (*Ber. ub. d. Veterinärwesen im Kgr. Sachsen.*, 1883, p. 94) states that he has frequently observed that the flesh of cows which have suffered from metritis after parturition, and in which at the same time the placenta was wholly or partially retained, produces distinct poisonous symptoms when eaten—vomiting and purging—even where the metritis has existed for a few days only.

OEFFINGER (*Die Ptomaine*, Wiesbaden, 1885) has separated several alkaloids from the flesh of decaying white fish (*Leuciscus alburnus*); one of the alkaloids has a curara-like action.

SALKOWSKI (*Zeitschrift f. physiol. Chem.*, ix. S. 8 u. S. 23, 1885) describes at considerable length the mode of preparation, chemical properties, and physiological action of a new product of the putrefaction of albuminoids, which he designates "skatolcarbon-säure." The behavior of this acid with dilute ferric chloride is peculiar and characteristic, the mixture assuming a dirty grayish-

blue color. If the mixture now be acidulated with hydrochloric acid, a grayish-violet precipitate is formed, which, if separated by filtration, will be found to dissolve in alcohol with a cherry-red color. Salkowski has found the acid in normal urine, and believes it to be a normal constituent; its quantity is increased in ileus, peritonitis, etc.

LÉPINE and GUÉRIN (*Journ. d. pharm. et d. chim.*, xi. p. 162, 1885) have found that healthy human urine causes myosis, abolition of the reflexes, slowing of the respiration, and death when injected into the circulation of rabbits; 60 c.c. (2 ounces) suffice to cause death. They have succeeded in separating poisonous alkaloids from the urine of patients suffering from typhus, pneumonia, diabetes, and jaundice.

HAGER (*Pharm. Centralbl.*, No. 18, p. 213) reports the poisoning of five cows from drinking water in which guano sacks had been washed, and attributes the poisonous effects to the presence of ptomaines in guano.

BOCKLISCH (*Ber. d. deutsch. chem. Ges.*, xviii. S. 86 u. 1922) communicates an interesting article on the ptomaines obtained from putrid fish, and points out that different kinds of fish produce different alkaloids. He carefully analyzed the products of putrefaction of herrings, and found that besides cadaverine, putrescine, and gadinine, there was present a large quantity of trimethylamine, and methylamine. These latter alkaloids have not yet been obtained from any other variety of putrid fish.

POISONING BY CHEESE.

VAUGHAN (*Board of Health Report*, State of Michigan, U. S., 14th July, 1885) divides poisonous cheeses into two classes: first, those which are poisonous on account of their accidentally containing poisonous metallic salts, or because they are prepared from the milk of animals which have fed upon poisonous plants, as veratrum, euphorbium, etc.; and, secondly, those which, innocuous at first, become poisonous after being kept for some time, owing to the development of poisonous products. It is those products which Vaughan has particularly investigated, and he has been able to separate a crystalline body, which he names tyrotoxicon (from τυρός, cheese), and which appears to produce poisonous effects similar to those caused by cheese.

ALLEGED HOMICIDE BY CHLOROFORM-POISONING.

A case of this nature, known as the Bartlett case, and which has recently excited much attention in England, has been brought to a conclusion by the acquittal of the prisoner, who was the wife of the man supposed to be poisoned by chloroform. The peculiarity of the case was that the chloroform had been swallowed—not inhaled—and that it was alleged by the prosecuting counsel that, in order to prevent her husband, who was sick in bed, resisting the drinking or swallowing of the chloroform, the accused had first of all rendered him partly insensible by the inhalation of chloroform vapor, and then poured chloroform into his mouth. Chloroform was found in the stomach. Although the accused was acquitted, there were several circumstances which raised a strong suspicion of homicide. This is the first case of alleged poisoning by the swallowing of chloroform which has come into court.

ALLEGED POISONING BY COLCHICINE.

BROUARDEL (*Annal. d'hyg. publ.*, Ser. 3, t. xv. pp. 230–283) communicated to the Soc. de Médecine Légale de France, on January 11, 1886, the result of a lengthened investigation of a case of supposed homicide by colchicine. The body of the deceased was examined eight months after death. The symptoms immediately preceding death indicated gastric irritation—vomiting, diarrhœa, etc.—and were such as not to exclude the hypothesis that death had been caused by colchicine. At the autopsy no natural cause of death was discoverable. The body was in an excellent state of preservation, and might have been dead for only a few days instead of eight months. The chemical analysis of the organs revealed the presence of an alkaloid which gave the reactions of colchicine. The organs examined were the stomach, intestines, liver, kidneys, heart, brain, and lungs. They were extracted by means of alcohol containing tartaric acid. The evaporated extract was dissolved in dilute alcohol, and was shaken with petroleum ether in order to remove fatty matters. The ethereal fluid was poured off, and chloroform was then added to the purified alcoholic fluid and shaken with it, in order to dissolve out the colchicine. In this manner a yellowish resin-like semi-solid residue was obtained, possessing the odor of skatol. On adding a drop of nitric acid (specific gravity 1.4), a feeble violet coloration was obtained which speedily disappeared; a small quantity of potash was now added and produced an orange-red coloration. These reactions are generally regarded as characteristic of colchicine. Another portion of the extract was further purified and tested by means of potassium teriodide, and other alkaloidal precipitants, and was found to be precipitated by each. The physiological action of the extract was tried on a dog, but without any decided effect. Brouardel and the experts associated with him, therefore, concluded that the results of their examination were consistent with the hypothesis that the deceased died by colchicine. The *juge d'instruction*, after receiving this report, committed the case to Vulpian and Schutzenberger, in order that a fresh investigation might be made of it. These experts came to the same conclusion as Brouardel. In addition to the nitric acid and potash test, they employed the reaction with sulphovanadate of ammonia, lately suggested by Mandelin, a pupil of Dragendorff, as a test for colchicine. This reagent, dissolved in sulphuric acid (1 in 200), gives an intense green coloration with colchicine which rapidly passes into a brownish-violet. The accused was acquitted.

 THE RESULTS OF RECENT INVESTIGATIONS OF PORK.

DR. HERRMANN EULENBERG, in the *Viertelj. f. gerichtl. Med.*, 1886, N. F. Bd. xlv. S. 150–161, summarizes the results of the various recent investigations of the flesh of swine, and states the following conclusions: (1) Pork which contains single concretions of an unknown character, or concretions composed of distomæ or haplococci in small quantity, is fit for consumption. (2) Pork which contains trichinæ or which is measly, may be used under proper restrictions. (3) Pork which contains numerous concretions, whatever be their cause, or actinomycetes, should only be employed for the preparation of lard.

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TO READERS AND CORRESPONDENTS.

ALL communications intended for insertion in the Original Department of this Journal are only received for consideration with the distinct understanding that they are sent for publication to this Journal alone, and that abstracts of them shall only appear elsewhere subsequently, and with due credit. Gentlemen favoring us with their communications are considered to be bound in honor to a strict observance of this understanding.

Contributors who wish their articles to appear in the next number are requested to forward them before the 10th of October to the Editor,

NO. 1004 WALNUT STREET, PHILADELPHIA, U. S. A. ; or

NO. 63 MONTAGU SQUARE, HYDE PARK, W. LONDON, ENGLAND.

Liberal compensation is made for articles used. Extra copies, in pamphlet form with cover, will be furnished to authors in lieu of compensation, *provided the request for them be written on the manuscript.*

The following works have been received for review :

A System of Practical Medicine. By American Authors. Edited by WILLIAM PEPPER, M.D., LL.D., Provost and Professor of the Theory and Practice of Medicine and of Clinical Medicine in the University of Pennsylvania. Assisted by LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania. Vol. V. Diseases of the Nervous System. Philadelphia : Lea Brothers & Co., 1886.

Bright's Disease, and Allied Affections of the Kidneys. By CHARLES W. PURDY, M.D. (Queen's Univ.), Professor of Genito-Urinary and Renal Diseases in the Chicago Polyclinic, etc. With new and original illustrations. Philadelphia : Lea Brothers & Co., 1886.

A Manual of Practical Therapeutics, considered with reference to Articles of the Materia Medica. By EDWARD JOHN WARING, C.I.J., M.D. London. Edited by DUDLEY W. BUXTON, M.D., B.S. Lond. Fourth edition. Philadelphia : P. Blakiston, Son & Co., 1886.

A Treatise on the Diseases of the Nervous System. By WILLIAM A. HAMMOND, M.D., Surgeon-General U. S. Army (retired list), Professor of Diseases of the Mind and Nervous System in the New York Post-Graduate Medical School. New York : D. Appleton & Co., 1886.

Medicine of the Future. An Address prepared for the Annual Meeting of the British Medical Association in 1886. By AUSTIN FLINT (Senior), M.D., LL.D. New York : D. Appleton & Co., 1886.

Analysis of the Urine. With Special Reference to the Diseases of the Genito-Urinary Organs. By H. B. HOFMANN, Professor in the University of Gratz, and R. ULTMANN, Docent in the University of Vienna. Translated by T. BARTON BRUNE, A.M., M.D., late Professor of the Practice of Medicine in the Baltimore Polyclinic and Post-Graduate Medical School, and H. HOLBROOK, CURTIS, Ph.B., M.D., Fellow of the New York Academy of Medicine. Second edition, revised and enlarged. New York : D. Appleton & Co., 1886.

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Manual of Differential Medical Diagnosis. By CONDUCT W. CUTLER, M.S., M.D., Physician to the New York Dispensary. New York : G. P. Putnam's Sons, 1886.

On Disorders of Digestion. Their Consequences and Treatment. By T. LAUDER BRUNTON, M.D., F.R.S., Assistant Physician and Lecturer on Materia Medica at St. Bartholomew's Hospital, London. London : Macmillan & Co., 1886.

The Private Treatment of the Insane as Single Patients. By EDWARD EAST, M.R.C.S., L.S.A., Member of the Medico-Psychological Association, London. London : J. & A. Churchill, 1886.

The Modern Treatment of Stone in the Bladder by Litholapaxy. A Description of the Operation and Instruments, with Cases Illustrative of the Difficulties and Complications met with. By P. J. FREYER, M.A., M.D., M.Ch., Bengal Medical Service, Civil Surgeon, Mussoorie. London : J. & A. Churchill, 1886.

A Code of Rules for the Prevention of Infectious and Contagious Diseases in Schools. Being a Series of Resolutions passed by the Medical Officers of Schools Association, January 7, 1885. Second edition. London : J. & A. Churchill, 1886.

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Spasm in Chronic Nerve Disease. Being the Gulstonian Lectures delivered at the Royal College of Physicians of London, March, 1886. By SEYMOUR J. SHARKEY, M.A., M.B. Oxon, Assistant Physician and Joint Lecturer on Pathology at St. Thomas's Hospital. London, 1886.

The Unity or Duality of Syphilis Historically Considered. By J. L. MILTON, Senior Surgeon to St. John's Hospital for Diseases of the Skin. (From a paper read before the Wellan Society.)

The Pathology and Treatment of Dropsy. By JAMES BARR, M.D., F.R.C.S. Edinb., Physician to the Stanley Hospital, Liverpool.

The Retrospect of Medicine. Vol. XCIII. January-June, 1883. London : Simpkin, Marshall & Co., 1886.

Lehrbuch der Physiologie für akademische Vorlesungen und zum Selbststudium. Part 10. By DR. A. GRUENHAGEN.

Ueber das Verhalten verschiedener Bacterienarten in Trinkwasser. Von MEADE BOLTON, M.D. (Univ. Va.), aus Richmond, Virginia, U. S., 1886.

Papillom am 5 Luftröhrenknorpel auf laryngoscopischem Wege entfernt. Von DR. C. LABUS, aus Mailand, 1886.

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Monomanie Sans Delire. An Examination of the "Irresistible Criminal Impulse Theory." By A. WOOD BENTON, M.A., LL.B., of Gray's Inn, and of the Oxford Circuit, Barrister-at-Law. Edinburgh : T. & T. Clark, 1886.

Nuovo Metodo di Cura Chirurgico delle Granulazioni Congiuntivale, propoerto. Dal DR. CECCHINI SETTIMO, Assistente d'Anatomia Patologica nella R. Università di Modena.

Istituto Anatomico-Patologico della R. Università di Modena. Sulla Riproduzione Sperimentale della Milza nei Polli, Cani, Conigli e Rane, Comunicazione Preventiva Fatta alla Società Medico Chir. di Modena. Dal DOTT CECCHINI SETTIMO, Assistente nell'Istituto Anatomico-Patologico della R. Univ. di Modena. Modena, 1886.

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Twenty-fifth Annual Report of the Professor of Physical Education and Hygiene to the Board of Trustees of Amherst College, June 29, 1886.

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The Negro Problem from a Medical Standpoint. By F. TIPTON, M.D. Selma, Ala., 1886.

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Nitro-Glycerine in the Treatment of Chronic Nephritis. By FRANCIS KINNICUTT, M.D., Physician to the St. Luke's Hospital and the New York Cancer Hospital. New York, 1886.

Permanent Drainage for Ascites. By LLEWELLYN ELIOT, M.D., Washington, D.C.

Osteo-Sarcoma of the Orbit. By CHARLES W. KOLLOCK, M.D. Charleston, S. C.

Intubation of the Larynx for Diphtheritic Croup. By E. FLETCHER INGALLS, A.M., M.D., Professor of Laryngology, Rush Medical College. Chicago, 1886.

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International Electrical Exhibition, 1884. Report of Examiners of Section XXIII. Electro-Medical Apparatus. Philadelphia, 1886.

Progressive Muscular Atrophy, beginning in the Legs. By J. B. MARVIN, M.D., Professor of Principles and Practice of Medicine and Clinical Medicine in the Kentucky School of Medicine.

The Aim and Purpose of the Medical Man. By J. B. MARVIN, M.D., Professor of Principles and Practice of Medicine and Clinical Medicine in the Kentucky School of Medicine, Louisville, Ky.

Meconeuropathia. By C. H. HUGHES, M.D., St. Louis, Mo.

A Visit to Gheel. By CHARLES W. PILGRIM, M.D., Assistant Physician to the New York State Lunatic Asylum, Utica, N. Y.

The Value of the Knee Phenomenon in the Diagnosis of Disease of the Nervous System. By PHILIP ZENNER, A.M., M.D., Lecturer on Diseases of the Nervous System in the Medical College of Ohio, Cincinnati. Chicago, 1886.

Typhoid Fever; its Cause and Prevention. By J. F. KENNEDY, M.D., Secretary of Iowa State Board of Health.

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On some Points of Interest Connected with the Wanklyn Method of Sanitary Water Analysis, particularly on the Detection of Recent Sewage, and the Determination of the Nature of the Organic Matter. By CHARLES SMART, Major and Surgeon U. S. Army.

Malarial Hæmaturia. By R. H. DAY, M.D., Baton Rouge, La.

Medical Expert Testimony and the Hypothetical Question. By WILLIAM C. WEY, M.D., Elmira, N. Y.

The Treatment of White Swelling of the Knee. By A. B. JUDSON, M.D., Orthopædic Surgeon to the Outpatient Department of the New York Hospital.

Hard Chancre of the Eyelids and Conjunctiva. By DAVID DE BECK, M.D. Cincinnati, 1886.

Medical Education and Medical Licensure. An Address delivered before the Twenty-third University Convocation, at Albany, July 9, 1886. By WM. H. WATSON, A.M., M.D., Regent of the University of the State of New York. Albany, 1886.

Transactions of the South Carolina Medical Association. Thirty-sixth Annual Session, held in Camden, S. C., April, 1886. Charleston, S. C., 1886.

Transactions of the Medical Society of the State of West Virginia. Nineteenth Annual Session, held at Charleston, May, 1886. Wheeling, 1886.

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Reports of Proceedings of the Michigan State Board of Health. July 13, 1886.

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Annual Report on the State of the Asylum for the Relief of Persons Deprived of the Use of their Reason. Philadelphia, 1886.

Report of the Managers of the State Lunatic Asylum, at Utica, for the year 1885. Albany, 1886.

Report of the Metropolitan Throat Hospital for the Treatment of Diseases of the Nose and Throat. New York.

The following Journals have been received in exchange :

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| Annales de Dermatologie et de Syphiligraphie. | Ophthalmic Review. |
| Annales de Gynécologie. | Provincial Medical Journal. |
| Annales des Maladies des Organes Genito-Urinaires. | Practitioner. |
| Archives de Médecine et de Pharmacie Militaires. | Australian Medical Journal. |
| Archives de Neurologie. | Indian Medical Gazette. |
| Archives de Tocologie. | Bibliothek für Læger. |
| Archives Générales de Médecine. | Nordiskt Medicinskt Arkiv. |
| Bulletin Générale de Thérapeutique. | Upsala Läkareförenings Förhandlingar. |
| Gazette de Gynécologie. | Kronika Lekarska. |
| Gazette Hebdomadaire de Médecine et de Chirurgie. | Annali Universali di Medicina e Chirurgia. |
| Gazette Hebdomadaire des Sciences Médicales de Montpellier. | Archivio di Orthopedia. |
| Gazette Médicale de Nantes. | Gazzetta degli Ospitali. |
| Gazette Médicale de Paris. | Gazzetta Medica di Torino. |
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| L'Encéphale. | Giornale Italiano delle Malattie Venere e della Pelle. |
| Les Nouveaux Remèdes. | L'Imparziale. |
| Le Progrès Médical. | Lo Sperimentale. |
| L'Union Médicale. | Rivista Internazionale di Medicina e Chirurgia. |
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| Revue de Chirurgie. | O Correio Medico de Lisboa. |
| Revue de Médecine. | Cronica Medico-Quirurgica de la Habana. |
| Revue de Thérapeutique. | União Medica, Rio de Janeiro. |
| Revue des Sciences Médicales. | Allgemeine wiener medizinische Zeitung. |
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| Lancet. | Monatshefte für praktische Dermatologie. |
| Liverpool Medico-Chirurgical Journal. | Wiener medizinische Presse. |
| London Medical Record. | Zeitschrift für klinische Medicin. |
| Medical Chronicle. | Zeitschrift für physiologische Chemie. |

The usual list of American Journals has been received, but their individual acknowledgment is prevented by lack of space.

CONTENTS.

ORIGINAL COMMUNICATIONS.

	PAGE
Perforating Inflammation of the Vermiform Appendix; with Special Reference to its Early Diagnosis and Treatment. By REGINALD H. FITZ, M.D., Shattuck Professor of Pathological Anatomy in Harvard University	321
Bacteriology. By W. WATSON CHEYNE, M.B., F.R.C.S., Assistant Surgeon to King's College Hospital, London	346
The Tendon-jerk and Muscle-jerk in Disease, and Especially in Posterior Sclerosis. By S. WEIR MITCHELL, M.D., Member of the National Academy of Sciences, and MORRIS J. LEWIS, M.D., of Philadelphia . .	363
Insanity and Crime. By RICHARD J. KINKEAD, M.D., Professor of Obstetric Medicine, and Lecturer on Medical Jurisprudence, Queen's College, Galway	373
Reflex Aural Symptoms without Aural Disease. Aural Disease Exciting Reflex Symptoms. By C. J. BLAKE, M.D., Instructor in Diseases of the Ear, Harvard Medical School; Aural Surgeon to the Massachusetts Charitable Eye and Ear Infirmary; and T. M. ROTCH, M.D., Instructor in Diseases of Children, Harvard Medical School; Physician to the Boston Dispensary	384
Yellow Fever; its Transmission by Means of the Culex Mosquito. By CHARLES FINLAY, M.D., Member of the Academy of Medical, Natural, and Physical Sciences of Havana, and of the "Sociedad de Estudios Clinicos"	395
The Local Treatment of Pseudo-membranous Croup: Intubation of the Larynx. By J. LEWIS SMITH, M.D., Clinical Professor of Diseases of Children in Bellevue Hospital Medical College, New York	409
Abnormal Visual Sensations. By F. R. CROSS, M.B. Lond., F.R.C.S., Ophthalmic Surgeon to the Bristol Royal Infirmary, Surgeon to the Bristol Eye Hospital, etc.	415

	PAGE
The Surgery of the Pancreas, as Based Upon Experiments and Clinical Researches. By N. SENN, M.D., Attending Surgeon to the Milwaukee Hospital; Professor of the Principles and Practice of Surgery and of Clinical Surgery in the College of Physicians and Surgeons, Chicago, Illinois	423
Castration in Mental and Nervous Diseases. A Symposium. By SIR T. SPENCER WELLS, Bart., late President of the Royal College of Surgeons of England; DR. ALFRED HEGAR, Professor of Obstetrics and Gynecology in the University of Freiburg; and ROBERT BATTEY, M.D., formerly Professor of Obstetrics in the Atlanta Medical College	455

REVIEWS.

The International Encyclopedia of Surgery. A Systematic Treatise on the Theory and Practice of Surgery, by Authors of Various Nations. Edited by JOHN ASHHURST, JR., M.D., Professor of Clinical Surgery in the University of Pennsylvania. Vol. VI.	491
Medicine of the Future. An Address prepared for the Annual Meeting of the British Medical Association in 1886. By AUSTIN FLINT (Senior), M.D., LL.D.	495
Dictionary of Practical Surgery, by Various British Hospital Surgeons. Edited by CHRISTOPHER HEATH, F.R.C.S., Holme Professor of Clinical Surgery in University College, London; Surgeon to University College Hospital; Member of the Council and Court of Examiners of the Royal College of Surgeons of England	498
Hyperalimentation in Phthisis.	
Die Uebernährung bei der Lungenschwindsucht. Von DR. E. PEIPER, Greifswald.	
Hyperalimentation in Phthisis. By DR. E. PEIPER.	
Usvoyeniye i obmen azotistui kh veshchestv pri kormlenii chakhotochnuikh po sposobu Debove' a. By M. G. KURLOFF.	
Assimilation of Nitrogenous Substances in the Hyperalimentation of Phthisis Patients by Debove's Method. By M. G. KURLOFF	500
The Modern Treatment of Stone in the Bladder by Litholapaxy. A Description of the Operation and Instruments, with Cases Illustrative of the Difficulties and Complications met with. By P. J. FREYER, M.A., M.D., Bengal Medical Service; Civil Surgeon, Mussoorie	504

- Ueber die Topographischen Verhältnisse des Genitale einer inter partum verstorbenen Primipara. Nach einem Gefrierschnitte geschildert von DR. H. CHIARI, Professor der Pathologischen Anatomie an der deutschen Universität in Prag.
- On the Topographical Relations of the Genitals of a Primipara who died during Labor. Drawn from a frozen section by PROF. CHIARI 506
- Practical Clinical Lessons on Syphilis and the Genito-Urinary Diseases. By FESSENDEN N. OTIS, M.D., Clinical Professor of Genito-Urinary Diseases in the College of Physicians and Surgeons, New York 507
- Diseases of the Digestive Organs in Infancy and Childhood, with Chapters on the Investigation of Disease, and on the General Management of Children. By LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania, Physician to the Children's Hospital, Philadelphia, etc. 509
- Peste de Cadeiras ou Epizootica de Marajó, suas analogias com o Beri-beri. Pello DR. J. B. DE LACERDA.
- Hip Pestilence, or Marajó Epizootic; its Analogies with Beri-beri. By DR. J. B. LACERDA 512
- Recent Works on the Care of the Insane.
1. Handbook for the Instruction of Attendants on the Insane.
 2. How to Care for the Insane; a Manual for Attendants in Insane Asylums. By WILLIAM D. GRANGER, M.D., First Assistant Physician, Buffalo State Asylum for the Insane, Buffalo, N. Y. 513
- Studies in Pathological Anatomy. By FRANCIS DELAFIELD, M.D., Professor of Pathology and Practical Medicine in the College of Physicians and Surgeons, New York. Volume II. Part 2 515
- Bright's Disease, and Allied Affections of the Kidneys. By CHARLES W. PURDY, M.D., Queen's University, Professor of Genito-Urinary and Renal Diseases in the Chicago Polyclinic, etc. 516
- A Manual of Practical Therapeutics. Considered with Reference to Articles of the Materia Medica. By EDWARD JOHN WARING, C.I.E., M.D., F.P.C.P. London. Edited by DUDLEY W. BUXTON, M.D., B.S. 520
- Vorlesungen Ueber Orthopædische Chirurgie und Gelenkkrankheiten. Von DR. LEWIS A. SAYRE, etc. Zweite, sehr erweiterte Auflage. Autorisirte Deutsche Ausgabe. Von DR. F. DUMONT.
- Lectures on Orthopædic Surgery and Joint Diseases. By LEWIS A. SAYRE. Authorized German edition, by DR. F. DUMONT, etc. 520

QUARTERLY SUMMARY

OF THE

PROGRESS OF MEDICAL SCIENCE.

ANATOMY.

Under the charge of GEORGE D. THANE, M.R.C.S. ENG.,
Professor of Anatomy at University College, London.

	PAGE
The Short Muscles of the Thumb and Little Finger. By H. St. John Brooks	521
On the Central Connections of the Auditory Nerve. By Benno Baginsky	521
On the Skin of the External Auditory Meatus. By E. Kauffmann	522
The Adenoid Tissue of the Pituitary Membrane. By E. Zuckerkandl	522
On the Position of the Pelvic Organs in the Female. By A. Waldeyer and J. Symington	522

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

Under the charge of ROBERTS BARTHLOW, M.D., LL.D.,
Professor of Materia Medica, General Therapeutics, and Hygiene in Jefferson Medical College, Philadelphia.

A New Alkaloid—Hydrochlorate of Tulipiferine. By Prof. J. M. Lloyd and Dr. Bartholow	524
The Physiological Action of the Peptones and Albumoses. By Pollitzer	525
Milk and its Therapeutical Applications. By Dujardin-Beaumetz	525
Antipyrin. By Dr. Blanchard	527
Treatment of Typhoid Fever by Corrosive Sublimate. By M. Greifenberger	527
Another Method of Treating Typhoid. By Dr. Robin	528
Contribution to the Study of the Ferruginous Preparations employed Hypodermatically. By Dr. Hirschfeld	528
The Use of Cocaine in the Treatment of Venereal Diseases. By Bono	529
Cataract caused by Naphthalin. By MM. Bouchard and Charrin	529
The Consumption of Alcohol in France	529

	PAGE
Gelosin—A New Excipient and Vehicle. By Guérin	530
Piliganine. By Dr. Bardet	530
Salol, a New Antiseptic and Antirheumatic. By Dr. Sahli	530

M E D I C I N E.

Under the charge of WILLIAM OSLER, M.D., F.R.C.P. LOND.,
Professor of Clinical Medicine in the University of Pennsylvania.

ASSISTED BY

J. P. CROZER GRIFFITH, M.D., <i>Assistant to the Professor of Clinical Medicine in the University of Pennsylvania.</i>	WALTER MENDELSON, M.D., <i>Instructor in the Laboratory of the College of Physicians and Surgeons, New York.</i>
--	--

The Etiology and Curability of Pernicious Anæmia. By Reyher	531
On the Operative Therapeutics of Basedow's Disease. By Hack	532
Diabetic Hemiplegia. By R. Lépine and L. Blanc	532
On the Pathology of Multiple Neuritis and Alcohol Paralysis. By Op- penheim	533
Peripheral Neuritis in Phthisis. By MM. Pitré and Vaillard	534
An Unusual Form of Progressive Muscular Atrophy. By Charcot and Marie	534
Streptococcus in Pneumonia after Typhoid Fever. By H. Neumann	535
Diseases of the Heart Resulting from Over-exertion. By Leyden	536
Contributions to the Diagnosis and Therapeutics of Diseases of the Stomach. By Riegel	539
On the Treatment of Gastric Ulcer with the Albuminate of Iron. By E. Gempt	541
On the Diagnosis and Therapy of Perforative Peritonitis. By E. Wagner	541
Chyluria with Chylous Ascites. By Professor Senator	542
Improvement in the Use of Fehling's Solution. By I. Munk	543
Quantitative Determination of the Reducing Substances in Normal Urine. By Flückiger, Salkowski, and I. Munk	544
Albuminometry by Esbach's Method. By Esbach, Veale, and Guttman	544
Oxybutyric Acid in Diabetic Urine. By Stadelman	544
Conditions Affecting the Presence of the Volatile Fatty Acids in the Urine. By von Jaksch	545
A New Hæmometer. By von Fleischl	545

SURGERY.

(IN EUROPE.)

Under the charge of FREDERICK TREVES, F.R.C.S.,

Surgeon to, and Lecturer on Anatomy at, the London Hospital.

	PAGE
Recent Surgical Literature	545
Fracture of the Patella. By C. Brunner and F. Treves	548
Compound Fracture of the Patella. By Mr. G. R. Turner	549
On the Early Treatment of Prostatic Retention of Urine. By Mr. Buck- ston Browne	550
Hypertrophy of the Prostate. By Sir Henry Thompson	550
Hernia into the Foramen of Winslow. By Mr. Square	551
Trephining for Intracranial Abscess. By Mr. Hulke	551
Rest in the Treatment of Scrofulous Neck. By Mr. Treves	552
Antiseptics. By Dr. Kümmell, Dr. von Lesser, von Mosetig-Moorhof, Dr. Fränkel, and Schmidt	552
The Antiseptic Treatment of Erysipelas. By Dr. Haberkorn	553
Intestinal Obstruction due to Gall-stones. By Wising	553
On Fractures and Dislocations. By Prof. Bruns and F. Müller	554
Treatment of Complicated Fractures of the Long Bones. By Bircher and Hausmann	554
Dislocation of the Radius with Fracture of its Head. By W. Wagner	554
Resection of a Cancerous Oesophagus. By Mikulicz	554
Laryngectomy for Malignant Disease. By Dr. David Newman	555
Toxic Symptoms from Cocaine. By G. Bockl and Schilling	555
On the Results of Operation for Cancer of the Lip. By A. Wörner	555
Removal of Sebaceous Cysts. By Dr. C. Lauenstein	555
The Treatment of Malignant New Growths with Arsenic. By F. Köbel, Spitzer, and Hermann	556
Extirpation of Tumors of the Groin. By M. Kirmisson	556
Cyst of the Pancreas. By F. Salzer	556
Epithelioma of the Breast. By Prof. Czerny	557
Osteochondro-sarcoma of Breast. By Mr. Battle	557
Abscess in the Antrum of Highmore. By Mikulicz and Ziem	557
Tetanus. By Rosenbach	558

(IN AMERICA.)

Supravaginal Amputation of the Uterus for Uterine Fibroids. By Dr. F. Lange	558
Alexander's Operation By Dr. William M. Polk	559

	PAGE
Laparotomy for Suppurative Peritonitis. By Dr. R. J. Hall	559
Intubation of the Larynx. By Dr. Joseph O'Dwyer and Dr. Frank E. Waxham	560
On Fatty and Sarcomatous Tumors of the Knee-joint By Dr. Robert F. Weir	561

OPHTHALMOLOGY.

Under the charge of CHARLES STEDMAN BULL, A.M., M.D.,

Lecturer on Ophthalmology in the Bellevue Hospital Medical College, Surgeon to the New York Eye and Ear Infirmary.

Experimental Investigations of Intraocular Tension. By Hölzke	561
Capsulectomy and a New Capsulectotome. By Telnikin	562
The Physiological and Pathological Action of Cocaine. By Pflüger	562
A Remarkable Case of Exophthalmos. By Motais	563
An Experimental Contribution to the Doctrine of Glaucomatous Excavation. By Laker	563
Modified Sclerotomy in Cases of Corneal Staphyloma with Persistent Prolapse of the Iris By Inonye	563
Injections and Dressings of Eserine and Ocular Antisepsis. By Wecker	564
Diagnosis of Simulated Unilateral Amblyopia. By Chauvel	564
On Latency in Cerebral Tumor—a Case of Relapsing Neuritis. By Anderson	565
The Excision of the Retrotarsal Folds and other Procedures for the Cure of Trachoma. By Hotz	565
Irritable Stricture of the Urethra in the Male, Resulting from Masturbation, a Cause of Hyperæsthesia of the Retina. By Beaver	566
Contribution to the Knowledge of Xanthopsia. By Thilbert	566
The Occurrence of Microorganisms in the Conjunctival Sac in Phlyctenular Conjunctivitis and other Conditions of the Conjunctiva and Cornea. By Gifford	567
Subconjunctival Lipoma in Connection with Ichthyosis Hystrix. By Bögel	568
The Extraction of Intraocular Cysticerci. By Leber	568
The Therapeutic Value of Laceration of the External Nasal Nerve. By Lagrange	569
Studies on the Extraction of Cataract. By Bettremieux	569

OTOLOGY.

Under the charge of CHARLES H. BURNETT, M.D.,

Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine, etc.

PAGE

Acute and Chronic Purulent Inflammations of the Middle Ear Tract and their Complications. By Dr. Samuel Sexton	569
A New Operation for the Radical Cure of Chronic Purulent Inflammation of the Middle Ear Tract. By Dr. Sexton	570
Suppuration of the Tympanic Cavity Treated with Instillations of Corrosive Sublimate Solutions. By Dr. Dujardin	571
Trephining for Evacuation of Intracranial Abscess Occurring in Connection with Suppurations in the Ear. By Mr. J. W. Hulke	571
Certain Technical Details Relating to Operations on the Mastoid. By Dr. A. H. Buck	574
Epileptiform Attacks Caused by Simple Chronic Non-suppurative Otitis Media. By Dr. Noquet	576
Tinnitus Aurium in Affections of the Stomach. By Dr. E. Ménière	576

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

Under the charge of J. SOLIS-COHEN, M.D.,

Professor of Diseases of the Throat and Chest, Philadelphia Polyclinic.

Treatment of Diphtheria by Fumigations of Coal Tar and Turpentine. By M. Cadet de Gassicourt	577
The Nasal Douche. By Dr. E. J. Moure	578
The Relation of Diseased Nasal Mucous Membrane to Asthma. By M. Bresgen, W. Lublinski, and Dr. Böcker	578
Intranasal Disease and Exophthalmic Goitre. By Prof. Hack	580
Hay Fever. By Dr. Beverly Robinson	580
Tuberculosis of the Larynx. By Prof. Massei	581
Lactic Acid as a Curative Agent in Tuberculous Ulcerations of the Larynx. By Dr. Hering	581
Tuberculous Tumors of the Larynx. By Dr. Percy Kidd	581
Spasm of the Larynx and Epilepsy. By Prof. H. Widerhofer	582
Laryngeal Neuroses of Central Origin. By Dr. H. Krause	582
Laryngeal Paralyses. By Drs. J. Charazac, F. H. Hooper, and J. Solis Cohen	584
Feeding by the Stomach-tube after Tracheotomy. By Mr. S. Herbert Habershon	585
Laryngectomy. By Dr. J. Baratoux	585

DERMATOLOGY.

Under the charge of LOUIS A. DUHRING, M.D.,

Professor of Dermatology in the University of Pennsylvania,

AND

HENRY W. STELWAGON, M.D.,

Physician to the Philadelphia Dispensary for Skin Diseases.

	PAGE
Hydroa. By Crocker	586
A Case of Lichen Planus. By Finny	587
Cases of Orbital Nævi Treated by Electrolysis. By Snell	587
The Relation of Lupus Vulgaris to Tuberculosis. By Max Bender	587
Molluscum Contagiosum—an Analysis of Fifty Cases. By Allen	588
Notes upon Lanolin. By G. H. Fox, W. G. Smith, and Liebreich	590

MIDWIFERY.

Under the charge of FRANCIS H. CHAMPNEYS, M.B., F.R.C.P.,

Obstetric Physician to St. George's Hospital.

Palpation of the Uterus per Vaginem. By Sänger	590
Case of Twins Occupying a Common Amniotic Cavity in which the Cords were Interlaced and Coiled Round Fœtal Parts. By Sedlacek	591
Pregnancy in One Horn of Uterus Bicornis; Retention of the Mature Fœtus; Removal of the Pregnant Horn. By Wiener	591
On Adenoma of the Placenta. By Klotz	592
On Habitual Death of the Fœtus in Utero due to Renal Disease in the Mother. By Fehling	592
Hydrastis Canadensis does not Induce Uterine Contractions. By Schatz	593
On the Etiology of Face Presentations. By Schatz	593
Injuries of the Vagina and Perineum Accompanying Labor. By Freund	593
Prolapse of the Umbilical Cord through the Rectum. By Stroynowski	594
On the Continuous Catgut Suture in Cases of Ruptured Perineum. By Keller	595
On the Application of the Forceps to the After-coming Head. By Freudenberg	595
Recent Improvements in the Performance of Cæsarean Section. By Sänger	596
The Etiology of Puerperal Mastitis. By Bumm	597
On the Elimination of Various Substances through the Milk. By Fehling	598
How can most Air be Made to Pass in and out of the Chest of Children Born in a State of Asphyxia. By Lahs	599
On the Value of Schultze's Swinging Movements for Resuscitating Apparently Stillborn Children. By Skutsch	599
Some Remarks on Infant Feeding. By Dr. Henry Ashby	600

GYNECOLOGY.

	PAGE
On the Suppuration and Discharge into Mucous Cavities of Dermoid Cysts of the Pelvis. By Mr. G. E. Herman	601
On Some Forms of Endometritis Corporis. By Löhlein	601
On Castration in Cavernous Myofibromata of the Uterus. By Dr. Goldenberg	603
On the Indications for the Site of the Operation in Cancer of the Cervix Uteri. By M. Hofmeier and Dr. Brennecke	604
On Extirpation of the Entire Uterus. By Dr. W. A. Duncan	607

MEDICAL JURISPRUDENCE AND TOXICOLOGY

Under the charge of MATTHEW HAY, M.D.,
Professor of Medical Jurisprudence, University of Aberdeen.

Three Cases of Injury of the Heart. By Dr. Schulte	608
Murder or Suicide? By Freyer	609
Case of Alleged Infanticide. By Kob	610
Antisepsis in Relation to Legal Responsibility. By Dr. Carl Deneke	611
The Changes which the Different Mercurial Salts undergo in the Organism. By Fleischer	611
Coal-gas Poisoning. By Warfvinge	612
Toxic Action on the Lower Fatty Acids. By Heinrich Mayer	612
The Cause of the Toxic Action of Chlorate of Potassium. By Stokvis	613
Effects of Drastic Poisons on the Intestinal Tract. By Lucien Butte	613
The State of the Corpse after Poisoning by Arsenic. By Prof. Zaaier	614
Injury to the Head. By Jaumes	615

PUBLIC HEALTH.

Under the charge of SHIRLEY F. MURPHY, M.R.C.S.

Milk Infection	615
Lead Poisoning. By Reichardt and Dr. Sinclair White	617
Industrial Diseases. By Bruhat, Dr. B. W. Richardson, F. Schüler, M. Raymondaud, and Dr. Boudet	618
Precautions against Infectious Diseases in Schools. By Dr. Annsperger	619

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PERFORATING INFLAMMATION OF THE VERMIFORM
APPENDIX;

WITH SPECIAL REFERENCE TO ITS EARLY DIAGNOSIS AND TREATMENT.¹

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It appears that even the most recent systematic writers are by no means agreed as to the exact relation of inflammation of the cæcum and that of the appendix to peritonitis and perityphlitis. The vital importance of the timely and appropriate treatment of the disease in question is becoming more and more apparent. Such treatment is often postponed till hopeless, even if its application is at any time entertained. It was, therefore, to be anticipated that the critical consideration of a large number of unquestionable cases of perforation of the cæcal appendix might serve to make prominent the features essential for diagnosis and treatment.

In 1834, James Copland, in his *Dictionary of Practical Medicine*,² first discriminated between inflammations of the cæcum, the vermiform appendix, and the pericæcal tissue. Isolated cases of fatal inflammation of the appendix had been published from time to time before this date. Their importance did not become well recognized, however, till after Dupuytren's views had been made known concerning the relation of the cæcum to the production of what had hitherto been termed iliac abscess, or phlegmon of the iliac fossa. At the instigation of this eminent surgeon, Husson and Dance³ published an article on the subject, apparently

¹ Read before the Association of American Physicians, June 18, 1886.

² Vol. i. p. 277.

³ Répertoire Gén. d'Anat., etc., 1827, iv. 154.

expressing his ideas. These were subsequently personally presented by him in his *Lectures on Clinical Surgery*.¹

In consequence of the interest thus aroused, Goldbeck,² at the suggestion of Puchelt, of Heidelberg, wrote his graduation-thesis upon the same subject. He adopted the views of the French writers, and applied the term perityphlitis to the disease described. His essay contains the report of a case of perforation of the appendix and associated peritonitis. But he regards it as one of fecal retention, and as quite distinct from the perityphlitis or inflammation of the connective tissue around the cæcum. He states that in fatal cases of the latter affection the appendix has been found intact.

Of the various names connected with the early history of the disease under consideration that of John Burne, Physician to the Westminster Hospital, deserves particular mention. In the first³ of two admirable articles separated by an interval of two years, he calls attention to the material difference in the character of inflammation of the appendix and that of the cæcum. He attributes this difference to the peculiar conformation and situation of the former. His second paper⁴ contains an additional number of cases of affections of the cæcum and appendix, a criticism of the opinions of the French writers, and a reiteration of his own views with such modifications as a more extended experience permitted. The name typhlo-enteritis is offered as an equivalent for inflammation and perforative ulceration of the cæcum and of the appendix.

In the interval between the publication of the above-mentioned articles Albers⁵ contributed a paper on inflammation of the cæcum. He first introduces the term typhlitis, and discriminates between acute, chronic, and stercoral typhlitis and perityphlitis. He charges Puchelt and foreign writers with confounding the last affection with the acute and stercoral varieties of typhlitis. The frequent termination of the perityphlitis in abscess is recognized, likewise the possibility of communication between the pus-cavity and that of the appendix or cæcum. This communication he regards as secondary. He says,⁶ "It is not at all clear just why the *processus vermiformis* should be so often affected, for in this disease perforation of the cæcum should be far more likely than that of the appendix."

Although the term perityphlitis thus became synonymous with inflammation of the pericæcal tissue, the tendency was inevitably toward the recognition of a somewhat similar clinical picture and a different anatomical seat. Oppolzer⁷ discriminated between cases of perityphlitis

¹ Leçons Orales de Clin. Chir., 1833, iii. 330.

² Ueber eigenth. entz. Geschw. i. d. rechten Hüftbeingegend, 1830.

³ Med.-Chir. Trans., 1837, xx. 219.

⁴ Ibid., 1839, xxii. 33.

⁵ Beob. auf d. Geb. d. Path. und Path. Anat., 2ter Theil., 1838, I.

⁶ Op. cit., p. 19.

⁷ Allg. Wiener med. Zeitung, 1858, xx. 81; xxii. 86.

where the inflammation was situated in the connective tissue about the cæcum, and others where the inflammatory swelling lay between the iliac fascia and the bone. These were further distinguished from cases of encysted peritonitis in this region, and from perforation of the appendix. The latter was stated to be always productive of a circumscribed peritonitis, except when the perforation took place through the adherent peritoneum. Then both peritonitis and inflammation of the subperitoneal tissue would occur. The anatomical seat of the inflammatory process was thus further complicated. Oppolzer suggested the term paratyphlitis, which, according to Eichhorst,¹ represents an inflammation of the connective tissue behind the cæcum, while perityphlitis designates an inflammation of the peritoneal coat of the cæcum and appendix. Typhlitis is applied to an inflammation of the appendix and of the cæcum. Whittaker² uses the same definitions, while Ziegler³ applies the term typhlitis to inflammation of the vermiform appendix, and perityphlitis to that of the parts in its vicinity.

The clinician obviously recognizes as of the chiefest importance the parts to which local treatment may be directly applied. His attention is thus conspicuously directed to the cæcum, which may be evacuated, or to the perityphlitic abscess, which may be emptied. The pathologist looks for the seat and causes of the disease, and finds that in most fatal cases of typhlitis the cæcum is intact, while the appendix is ulcerated and perforated. He sees that the so-called perityphlitic abscess is usually an encysted peritonitis. Furthermore, if an abscess exists in the pericæcal fibrous tissue, it is in most instances caused by an inflamed appendix. Finally, if the encysted peritoneal abscess, or the abscess in fibrous tissue behind the cæcum, does communicate with the latter, such an opening is usually the result, not the cause, of this abscess.

With,⁴ influenced by the predominant importance of the independent consideration of inflammation of the appendix and its results, uses the term appendicular peritonitis to indicate the perityphlitis proceeding from disease of the appendix. As a circumscribed peritonitis is simply one event, although usually the most important, in the history of inflammation of the appendix, it seems preferable to use the term appendicitis to express the primary condition. This may terminate as an appendicular peritonitis or as a paratyphlitis. In like manner the rare, primary, perforating typhlitis (cæcal perforation) may be followed by a perityphlitis—that is, an encysted peritonitis about the cæcum, or by a paratyphlitis. The perityphlitic abscess of the surgeon, when seen early, is thus usually an encysted peritonitis of appendicular origin. More rarely, at this date, it may be the result of a suppurative para-

¹ Handb. d. Spec. Path. und Therap., 2ter Aufl., 1885, ii. 188.

² Pepper's System of Pract. Med., 1885, ii. 814.

³ Lehrb. d. Path. Anat., 4te Aufl., 1885., ii. 1.

⁴ Nordiskt Med. Ark., vii. 1. London Med. Record, 1880, viii. 213.

typhlitis. The causes of this last affection are numerous and by no means confined to the appendix or cæcum, although a perforating inflammation of each of these parts of the intestinal tract may act as a cause.

Any attempt at explaining the various results of an inflammation of the appendix, must necessarily be preceded by a statement of the peculiarities it may present, with respect to structure and position. These peculiarities, though in part of congenital origin, in most instances bear evidence of having been acquired as the result of previous disease. This statement, based upon a long personal experience, is more than confirmed by the observations made elsewhere. Matterstock¹ states that Tüngel, during a period of two years at the Hamburg Hospital, found 30 instances of partial or complete obliteration of the appendix, 43 cases of catarrh and fecal concretions, 12 of abnormal adhesions, and 11 of tuberculous ulcers. All these in addition to perforations, and despite the fact that attention was not invariably directed to such peculiarities. Toft, as referred to by With,² found the appendix diseased in 110 out of 300 post-mortem examinations, every third person thus possessing a diseased appendix.

Personal observations have enabled me to recognize considerable variations in the length of the appendix, the longest being nearly six inches. Wister³ alludes to one which was nine inches long. It is frequently seen with an attached fold of peritoneum and fat tissue, suggesting an omentum or mesentery. Its free end has been found in the iliac fossa, as well as behind the cæcum; along the brim of the pelvis and hanging into the cavity of the latter. Irregular positions have often been associated with fibrous adhesions. The appendix has been found thus attached not only in the places above mentioned, but also with its tip directed upward and its course more or less parallel with that of the cæcum, either behind, to the right, or to the left of this structure. It has also been found adherent to the mesentery with its tip bent at right angles and lying between the appendix and this structure. Kraussold⁴ observed its course directed upward and backward, forming a loop around the ileum with its tip directed forward. It has been seen pointing outward, then forward, forming a loop around the lower end of the cæcum with its tip behind the latter.

Firket⁵ records the adherence of the appendix to the ileum throughout the length of the former, with a communication between the cavities of the two and without an evident ulceration of the mucous membrane. Adherence to the rectum with a communication between the cavities of

¹ Gerhardt's Handb. d. Kinderkrankh., 1880, iv. 2, 897.

² Trans. Coll. Phys. Philada., 1856-62, N. S., iii. 147.

⁴ Volkmann's Samml. klin. Vortr., 1881, xcvi. 1707.

⁵ Ann. d. l. Soc. Méd.-Chir. d. Liége, 1882, xxi. 58.

² Loc. cit.

each is recorded.¹ Adhesions of the tip to the mesentery, the rectum, and bladder are frequent. Its presence in a hernial canal led Shaw² to suspect a disease of the testicle. Thurmman³ records a like occurrence, and the formation of a scrotal tumor as large as the two fists in consequence of an inflammation of the appendix. Its tip has been found⁴ adherent to the abdominal wall in the vicinity of the navel, and pus has been discharged from it at this point.

Complete or partial obliterations of the canal are frequent. In the former instance a solid cord results. In the latter, a considerable cystic dilatation of the tip may follow; or a funnel-shaped pouch at the origin is often associated with obliteration of the remaining portion of the tube.

These variations in length, position, and patency, whether congenital or acquired, are of obvious importance in explaining many of the apparent differences in the clinical histories of typhlitis and perityphlitis. Their significance in the etiology of appendicitis will appear directly.

The frequent presence of foreign bodies in the canal of the appendix is of well-known occurrence. These are a variety of seeds, especially of fruit. Less common are hairs, particularly bristles, worms or their eggs, shot, pins, pills, and gall-stones. By far the most numerous are moulded masses of inspissated feces, more or less cylindrical in shape and of extreme variation in density. Some are of the consistency of normal excrement, while others are of stony hardness in consequence of their infiltration with earthy salts. The relative frequency of their presence in the appendix is manifested by the records of fatal cases of appendicitis, but their actual frequency far exceeds the number of these cases. In my own experience it is rather the rule than the exception for the appendix to contain moulded, more or less inspissated feces.

The frequency of such retention may be due to the congenital or acquired peculiarities of the appendix already described. German writers attach a certain importance to the presence of a valve-like projection of mucous membrane, discovered by Gerlach,⁵ at the mouth of the appendix. Although a pinhole opening may result, any considerable obstruction must be of extreme rarity. The habits of individuals with reference to diet and regulation of the bowels are of unquestioned importance. Equally significant is the controlling fact, that most persons suffering from habitual constipation and accustomed to swallow the seeds of fruit, escape inflammation of the appendix.

Recognizing the lack of agreement in the use of the terms typhlitis and perityphlitis, a collection has been made of 257 cases of perforating

¹ Trans. Lond. Path. Soc., 1876, xxvii. 161.

² Prov. Med. and Surg. Journ., 1848, 477.

³ Zeitschr. f. rat. med., 1847, vi. 12.

⁴ Ibid., 1848, i. 270.

⁵ Lancet, 1839-40, ii. 565.

inflammation of the appendix. By limiting the attention to the essential features of these cases, it was thought possible to recognize the characteristics of this sharply defined affection, by means of which it might be differentiated from all others occurring in this region. At the same time a comparison is drawn between many of these characteristics and those occurring in cases of typhlitis and perityphlitis. The latter terms are sufficiently indicative of a clinical picture, although its seats and causes suggest the importance of shades of distinction; 209 of these cases have been collected, and serve as the basis of a series of tables to be contrasted with those obtained from the analysis of the 257 cases of appendicitis.

The etiological importance of the presence of fecal masses and of foreign bodies in the production of inflammation of the appendix is well recognized. Matterstock¹ found in 169 cases of fatal perforating appendicitis that fecal concretions were present in 53 per cent., and foreign bodies in 12 per cent. In the series here collected, out of 152 cases the percentage² of fecal masses was 47 per cent., that of foreign bodies 12 per cent. It thus appears that in nearly one-half of the cases more or less inspissated feces were found, and that in nearly one-eighth of the series foreign bodies other than feces were present. Thus, in about three-fifths of all cases of perforating inflammation of the appendix either dried feces or foreign bodies were present in the tube. When seeds are stated to have been found, the evidence is not always sufficient to exclude the possibility of a mistake having been made as to the nature of the foreign body. Notwithstanding this large percentage the reality is undoubtedly much greater. Many are overlooked at the time of making the examination, others are macerated in the contents of the abscess. Still others, perhaps, escape with the pus, which makes its way outward through the various channels by which the abscess may communicate with the surface of the body.

The frequent immunity of the appendix from inflammation in the presence of inspissated feces and foreign bodies suggests the importance of other factors in the etiology. External violence is occasionally recorded as an immediate precursor of the attack. Among the 257 cases were 19 who were supposed to have received an injury, the result rather of indirect than of direct violence: from lifting a heavy weight in 9 instances, and from a fall or blow in 10. Among 209 cases of typhlitis and perityphlitis external violence immediately preceded the attack of the disease in 10 per cent.

Digestive disturbances are of obvious importance in the etiology of inflammation of the appendix, since this organ is a part of the alimentary canal. There were 15 instances of prolonged constipation, 9 of diarrhœa,

¹ Op cit.

² In general whenever percentages are given, fractions will be disregarded.

and 6 of vomiting. The attacks of diarrhœa and vomiting were usually the result of indiscretion in diet, but they were sometimes occasioned by the use of domestic remedies. These were administered for the relief of constipation or other disturbances attributed to a sluggish action of the stomach and bowels.

Among the cases of typhlitis and perityphlitis were 38 of constipation, 15 of diarrhœa, and 3 of vomiting; these symptoms being of apparent etiological importance.

Notwithstanding the frequency of typhoid fever and of intestinal tuberculosis, in which affections the mucous membrane of the appendix is often diseased, a resulting perforation seems to have been relatively infrequent. There were 8 of perforating ulcer of the tuberculous appendix, and 3 of this lesion in convalescence from typhoid fever.

Among the 209 cases of typhlitis and perityphlitis were 2 occurring in tuberculous persons.

The consideration of sex in 247 cases gives the following result: 197 males, 80 per cent., and 50 females, 20 per cent. These percentages are the same as those found by Fenwick¹ in the analysis of 130 cases.

In 209 cases of typhlitis and perityphlitis there were 156 males, and 53 females; 74 per cent. of the former, and 26 per cent. of the latter.

The age in 228 cases of appendicitis is recorded as follows:

From 20 months to 10 years	.	.	22	=	10 per cent.
" 10 years " 20 "	.	.	86	=	38 "
" 20 " " 30 "	.	.	65	=	28 "
" 30 " " 40 "	.	.	34	=	15 "
" 40 " " 50 "	.	.	8	=	3 "
" 50 " " 60 "	.	.	11	=	5 "
" 60 " " 70 "	.	.	1	=	$\frac{1}{2}$ "
" 70 " " 78 "	.	.	1	=	$\frac{1}{2}$ "

The age of the youngest patient was 20 months, that of the oldest, 78 years; 173 cases, 76 per cent. of the entire list, were under the age of 30 years, and nearly 50 per cent. were under the age of 20 years. Fenwick's² table of ages is based upon the consideration of 97 cases, and shows smaller percentages for the several decades up to the age of 40 years.

The age of the patient in 178 cases of typhlitis and perityphlitis was:

From 4 years to 10 years	.	.	10	=	6 per cent.
" 10 " " 20 "	.	.	53	=	30 "
" 20 " " 30 "	.	.	53	=	30 "
" 30 " " 40 "	.	.	25	=	14 "
" 40 " " 50 "	.	.	18	=	10 "
" 50 " " 60 "	.	.	10	=	6 "
" 60 " " 70 "	.	.	7	=	4 "
" 70 " " 78 "	.	.	2	=	1 "

¹ Lancet, 1884, ii. 987, 1039.

² Loc. cit.

From the above consideration it is apparent that perforating appendicitis is a disease most frequently occurring among healthy youths and young adults, especially males. Further, that attacks of indigestion and acts of violence, particularly from lifting, jumping, and falling, are exciting causes in one-fifth of the cases. A local cause is to be found in more than three-fifths of all cases in the retention in the appendix of more or less inspissated feces, or in the presence there of a foreign body. The retention of feces may be promoted by a constipated habit, but congenital or acquired irregularities in the position and attachments of the appendix frequently act as favoring causes. A fact in support of the last-mentioned statement is to be found in the frequency of successive attacks, one or more, of inflammation of the appendix. Among 257 cases were 28, 11 per cent., which presented similar symptoms of greater or less severity, at various intervals before the final attack. Recurrence is mentioned in 23 out of 209 cases, again 11 per cent., of typhlitis and perityphlitis.

The inflammatory process once excited, its course and results show extreme variations. A simple catarrhal appendicitis is to be recognized anatomically, but it is doubtful whether its clinical appreciation is possible. This appendicitis, in the absence of a concretion or foreign body, may progress toward ulceration, even to a peritonitis, which may terminate fatally. In the presence of a foreign body or concretion these events are of likely occurrence. On the one hand, the inflammation may result in the more or less complete obliteration of the canal of the appendix, with or without circumscribed dilatation. On the other, the ulcerative process becomes associated with a necrosis of the wall, a peritonitis, usually circumscribed at the outset, and perforation. In those cases where the appendicular peritonitis represents the extension of an inflammation through the wall of the appendix without perforation, permanent adhesions of the appendix to neighboring parts remain as evidence of the process. When it is associated with necrosis of the wall, the inflammation of the peritoneal coat tends to become diffused and productive of serous and cellular exudations. The adherence of coils of intestine to each other and to the abdominal wall favors the accumulation of the exudation in a limited space, and thus the formation of the tumor. At this stage the anatomical condition is a circumscribed peritonitis, the appendicular peritonitis of With. In certain instances the term perityphlitis might be applied in an exact anatomical sense, as the peritoneal inflammation frequently extends to the serous investment of the lower part of the cæcum. But in the last two cases of fatal appendicitis examined by me, the appendicular peritonitis was wholly pelvic. The changes observed in the appearance of the serous covering of the cæcum were of the same character as those affecting the peritoneum elsewhere. This peritoneal abscess may then become absorbed, or its

contents may escape into the general peritoneal cavity through ruptured or softened adhesions. In the latter event, as a rule, death rapidly follows. The exceptional case reported by Markoe¹ may be regarded as one of extreme rarity. A child with symptoms of general peritonitis on the second day, died a month later from another disease. The appendix had been perforated and the intestines were adherent in different places.

The product of the circumscribed peritonitis varies exceedingly in quality and quantity. Although it is usually thin, discolored, and very offensive, it may be thick, yellow, and odorless. In the post-mortem examination of a case of recent occurrence, where general peritonitis was the cause of death, the abscess contained perhaps an ounce of pus. The peritonitis was the result of a secondary mesenteric thrombophlebitis, while the primary appendicular peritonitis was apparently in a retrograde condition. The acute stage of the disease lasted more than six weeks. Barrett² states that he removed from a perityphlitic abscess, on the sixty-second day, more than a gallon of pus, liquid feces, and scybala. The presence of the last element indicates a communication with the large intestine.

If the case does not terminate as thus stated, the tumor may suddenly diminish in size with the discharge of pus from a hollow organ, as the intestine, bladder, or vagina. The anterior abdominal wall may become perforated and a sinus be established opening in the groin, lumbar region, or at the umbilicus. Shaw³ mentions the occurrence of multiple abscesses of the scrotum from a perforated hernial appendix, and Thurmann⁴ records a similar instance. Such sinuses often remain open for a long time, even many years. Through the kindness of Dr. A. T. Cabot, of Boston, I saw a patient with a fecal fistula which had existed for nineteen months. At the outset a tender swelling in the right groin had been incised, but the wound never healed. After an operation to promote the healing of the sinus, about an inch of the perforated appendix protruded from the wound. A similar protrusion had taken place six months earlier. The outer surface of the appendix was smooth, of a dusky red color, and the margin of the opening was sharply defined. Pressure upon the abdominal wall over the cæcum caused soft, yellow intestinal contents to appear in the wound.

The abscess may contain sloughs of tissue and yet be intraperitoneal. In a recent post-mortem examination I removed from the encysted abscess around the appendix a slough, three inches in length, representing the detached peripheral portion of the tube. Ballou⁵ records a case where the sloughed appendix was discharged per anum, the

¹ Am. Med. Monthly, 1857, viii. 231.

³ Loc. cit.

⁵ Trans. R. I. Med. Soc., 1877-82, ii. 418.

² Va. Med. Monthly, 1875-76, ii. 120.

⁴ Loc. cit.

patient recovering. In the case reported by Pooley,¹ apparently the entire appendix escaped as a slough from the wound.

The more protracted the course of the disease the greater is the probability of the destruction of the peritoneum forming the wall of the abscess. With the perforation of the parietal peritoneum may occur extensive necrosis, purulent and fecal infiltration of the abdominal walls. Within three weeks the iliac muscle may be destroyed and the ilium be bared. The course of the psoas and iliacus may be followed into the thigh, and extensive and deep-seated destruction of tissue with fecal infiltration be present in this region. The pus may extend through the obturator foramen, forming a deep-seated abscess of the hip and thigh, and may enter the hip-joint.

Moore² has shown that disease of the hip-joint may follow perityphlitis, and Gibney³ has called attention to the possibility of mistaking cases of perityphlitis for disease of the hip-joint. The primary appendicular peritonitis may in like manner be continued into the tissues behind the cæcum, and thus a secondary paratyphlitis or perityphlitic abscess be occasioned. So various are these possibilities that every case of so-called perityphlitic abscess must be regarded as primarily one of a perforating appendicitis unless proven to be the contrary.

With the frequent eventual destruction of the peritoneal wall of the abscess is the possibility of death from hemorrhage. Conant⁴ describes the case of a young man who died at the end of three weeks. There was no general peritonitis, but the abscess communicated with the cæcum (the appendix being destroyed) and held a pint of clotted blood. Fatal hemorrhage from ulceration of the deep circumflex iliac artery is recorded by Bryant.⁵ This case is not unlikely to have been one of appendicitis, although the condition of the appendix is not stated. Again, Powell⁶ reports a case where the appendix was adherent to the internal iliac artery, the cavities of the two being in communication. The colon and cæcum were distended with gas and dark blood.

The occurrence of disease of remote parts may be alluded to, as abscesses of the liver from pyelephlebitis or portal embolism in consequence of a mesenteric thrombophlebitis near the appendix. The affection of the liver and portal vein may be the result of a direct continuance of the phlebitis, or may follow putrid embolism from a thrombus in the immediate vicinity of the appendix. The extension of a secondary paratyphlitis may cause perforation of the diaphragm with a consecutive pleurisy or pericarditis.

In considering the symptoms of appendicitis, it is to be noted that attacks of inflammation frequently occur without giving rise to any

¹ N. Y. Med. Record, 1875, x. 267.

³ AM. JOURN. MED. SCI., 1881, lxxxii.

⁵ British Med. Journ., 1884, ii. 43.

² Lancet, 1864, ii. 514.

⁴ Am. Med. Monthly, 1858, x. 359.

⁶ N. O. Med. and Surg. Journ., 1855, xi. 468.

characteristic symptoms, and often without a suggestion of any distinct malady.

A comparison of the results of post-mortem examinations with the records of the previous histories of patients justifies this statement, unless it be urged that the disease occurred so early in life as to have been unappreciated or forgotten. Out of 227 cases of perforated appendix, however, 22, about 10 per cent., were under the age of ten years. This number is far too small to account for the occurrence of evidences of disease of the appendix in more than one out of every three autopsies.

The records of the Massachusetts General Hospital state that an individual with an appendix a half inch long, thickened, curved, and intimately adherent to the thickened and opaque subjacent peritoneum, never had symptoms of inflammation in this region. Another patient was never sick before his fatal illness, although the appendix and cæcum were closely united to the neighboring parts by old fibrous adhesions, and the canal of the appendix was obliterated. Still another patient was always well and strong till within eleven days of his death, yet the appendix was converted into a solid fibrous band intimately united by firm adhesions to the posterior wall of the cæcum. The severity of these lesions suggests the probability that apparently slight disturbances of digestion were overlooked. The diarrhœa, constipation, or abdominal pain, especially when occasionally recurrent, were regarded as characteristic of a feeble digestion. There can be but little doubt that a diagnosis of bilious attack, colic, gastritis, enteritis, gravel, ovaritis, congestion of the womb and the like, may not unfrequently conceal the existence of an inflamed appendix.

The latency of the symptoms in certain cases of appendicitis is such that the eventual diagnosis is obscured, and the desirable method of treatment hopelessly postponed. Buck¹ reports that a sailor was at work rolling barrels of flour till the day of his admission to the hospital. He then had a prominent iliac tumor extending along the outer half of Poupart's ligament. Fluctuation was transmitted from it to below the inner half of the ligament. Another sailor left Portland for New York, April 12, 1886, and arrived five days later. In the meantime he purged himself in consequence of a right iliac pain. Although suffering, he kept at work during the following week. He then left for Boston, where he arrived on the thirteenth day after the beginning of the pain. Symptoms of general peritonitis were evident, and he died the next day, General peritonitis was present, the result of an encysted inflammation about the appendix. This organ formed a gangrenous slough lying in the cavity of the abscess.

¹ New York Medical Journal, 1866, ii. 40.

The latency as well as the frequent obscurity of the symptoms of appendicular inflammation are thus apparent. The presence, therefore, of the symptoms now to be mentioned, in individuals from whom the history of one, and particularly of several such attacks is to be obtained, is of marked importance in aiding diagnosis.

Sudden, severe abdominal pain is the most constant, first, decided symptom of perforating inflammation of the appendix. It occurred in 216 out of 257 cases, 84 per cent. In most instances it is present in apparently healthy individuals, in a few it follows an attack of diarrhœa.

The pain is usually intense, rarely slight, and is occasionally accompanied by a chill, or nausea and vomiting.

The following table shows its localization in 213 cases of appendicitis, and, by way of contrast, in 92 cases of typhlitis and perityphlitis :

	Appendicitis.		Typhlitis and perityphlitis.	
	Cases.	Per cent.	Cases.	Per cent.
In right iliac fossa . . .	103	= 48	55	= 60
“ abdomen . . .	76	= 36	31	= 34
“ hypogastrium . . .	11	= 5	0	
“ umbilical region . . .	9	= 4	2	= 2
“ epigastrium . . .	4	= 2	4	= 4
“ stomach . . .	3	= 1	0	
“ hepatic region . . .	3	= 1	0	
“ left iliac fossa . . .	3	= 1	0	
“ right hip and groin . . .	1	= $\frac{1}{2}$	0	
Total . . .	213		92	

It is quite probable that the number of cases of more exactly localized pain would have been considerably greater had attention been specially directed to this point. Many of the recorded cases of abdominal and hypogastric pain would undoubtedly have permitted a more definite localization, especially as firm pressure often discloses a sensitive spot at some distance from the referred seat. Though usually limited to the fossa, the pain sometimes extends upward as far as the liver, or downward to the rectum, testicle, perineum, or thigh. The attack is occasionally associated with great nervous anxiety, and is at times followed by marked prostration, from which the patient rallies in the course of a few hours.

This sudden intense pain is presumably due, not to the actual beginning of the disease, but to the separation of the fresh adhesions of an acute appendicular peritonitis, and often, perhaps usually, to the perforation of the inflamed appendix. It generally represents the beginning of a more extensive peritonitis. An attempt has been made to ascertain the date of occurrence of this most important symptom. This was

possible in 61 cases of appendicitis, and in 64 cases of typhlitis and perityphlitis. It occurred as follows:

	Appendicitis.		Typhlitis and perityphlitis.	
	Cases.	Per cent.	Cases.	Per cent.
On the 1st day in . . .	41	= 67	48	= 75
“ 2d “ . . .	5	= 8	10	= 16
“ 3d “ . . .	12	= 20	2	= 3
“ 4th “ . . .	2	= 3	4	= 6
“ 5th “ . . .	1	= 2	0	
Total . . .	61		64	

If the pain is not accompanied by nausea and vomiting, these symptoms are not unlikely to follow. Their occurrence is recorded in 15 cases of appendicitis, and in 44 out of 209 cases of typhlitis and perityphlitis. The vomit quickly becomes green in color, but in general this symptom is not distressing at this stage of the disease. Diarrhœa is rarely present, while constipation is the rule.

The abdominal pain is followed by fever as the next constant symptom. The date of its appearance is noted in but 38 cases of appendicitis, and in only 16 of typhlitis and perityphlitis. It was present

	Appendicitis.		Typhlitis and perityphlitis.	
	Cases.	Per cent.	Cases.	Per cent.
On the 1st day in . . .	5	cases.	6	cases.
“ 2d “ . . .	18	“	7	“
“ 3d “ . . .	9	“	0	“
“ 4th “ . . .	6	“	3	“
Total . . .	38	“	16	“

The temperature is rarely very high, and the constitutional disturbances usually associated with an elevated temperature are frequently slight, if not absent. The maximum recorded in the cases here collected is 103.5° F., but the range is usually between 100° F. and 102° F. With¹ noticed an elevation of nearly 106° F. If violent or extreme changes take place, a complication may be expected, as an abscess of the liver, or a pleurisy from an extension of the local inflammatory process.

During the first three days following the onset of the pain, micturition is occasionally disturbed. Perhaps unusually frequent on the first day, it is likely to be difficult on or after the third day. In certain instances the use of the catheter is required. A satisfactory explanation of this latter feature is to be found in the abundant use of opium, usually necessary at this stage of the disease. The right testicle may be retracted and swollen, in which case the course of the pain is apt to be toward this gland.

The circumscribed swelling in the right iliac fossa now demands con-

¹ Loc. cit.

sideration. This symptom, when present, is evidently of the utmost value in diagnosis, as its appropriate treatment most favorably modifies the prognosis. The swelling represents the accumulation of the increasing exudation, at the outset the product of the peritonitis, and lies beneath the adherent coils of intestine which later become attached to the abdominal walls. Its usual seat is in the right iliac fossa, below a line extending from the anterior superior spine of the ilium to the navel, nearer the former and two finger-breadths above Poupart's ligament. It may lie nearer the median line or may approximate the iliac crest. The swelling may be found in the pelvis in those cases where the appendix becomes attached to the peritoneum of the pelvic wall. It is rare for the primary swelling to be paracæcal, although this variety occurs where the appendix lies embedded behind the cæcum.

The early products of the peritonitis are largely cellular and fibrinous; scanty, opaque, greenish masses are found encapsulated. This condition is obviously not to be recognized by physical signs. As the liquid exudation increases, dulness becomes apparent. This sign may be obscured by intervening and adherent coils of intestine, especially if they are distended with gas, when a superficial gurgling may be recognized. Again the contents of the abscess may be partly gaseous, a condition more likely to occur later in the course of the disease. A circumscribed resistance is felt on palpation. As the part is often extremely sensitive to pressure and the abdominal muscles tense, the administration of ether or chloroform may be necessary to confirm the diagnosis. A rectal examination not infrequently permits the recognition of the tumor which abdominal palpation fails to disclose, and should always be made in the latter event. Owing to the position of the abscess beneath the transversalis fascia, and to the fact that it is often covered by adherent coils of intestine, a sense of fluctuation is rarely perceived till much later in the history of the case.

The clinical characteristics of the tumor and its composition are thus made evident by modified resonance on percussion, circumscribed resistance on palpation, and a sense of fluctuation. Notwithstanding the importance of these signs, the records of 257 cases of appendicitis give comparatively little information with reference to the date of their appearance. The 209 cases of typhlitis and perityphlitis give a more satisfactory result.

Dulness was first noticed on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day in	0 cases.	2 cases.
2d "	2 "	0 "
3d "	1 "	7 "
4th "	4 "	5 "
5th "	1 "	2 "
6th "	2 "	0 "
7th "	1 "	1 "
8th "	1 "	4 "
9th "	0 "	1 "
10th "	0 "	3 "
Total	12 "	25 "

Palpation showed the presence of the tumor on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day in	1 case.	4 cases.
2d "	3 "	6 "
3d "	4 "	8 "
4th "	2 "	8 "
5th "	4 "	3 "
6th "	5 "	6 "
7th "	4 "	4 "
8th "	1 "	7 "
9th "	0 "	11 "
10th "	0 "	11 "
Total	24 "	68 "

An attempt has been made to determine the date at which fluctuation becomes evident. As a rule, its appearance is so late in the course of the disease (after the second week) as to be of little diagnostic value. An exploratory puncture with the needle of the aspirator is frequently recommended to determine the nature of the tumor. Too much stress is not to be laid upon this method of examination. If the aspirator fails to show the presence of pus, even after repeated punctures in divers spots, it by no means follows that pus is absent. Operators have frequently exposed the transversalis fascia over the tumor and have then punctured it in several places. Pus not appearing, the wound has been dressed. In the course of a few hours an abundant discharge of fetid matter has made its appearance in the dressings and at the bottom of the wound.

It is evident from the consideration of the above table, that the presence of the abscess may be expected as early as the third day. It may be large enough to contain some three pints of fluid on the fifth day. The following case reported by Peckham¹ apparently justifies the above conclusions.

¹ Boston Med. and Surg. Journ., 1882, cvi. 159.

His patient was a man of twenty-seven years of age, who had suffered from abdominal pain and diarrhœa for twenty-four hours. He was then seized with a severe pain in the right iliac fossa, which was fuller than the left, tender, and dull. On the following day the whole abdomen was tender, but there was no complaint of pain. The day after, there were great tenderness, dyspnœa, cold hands and feet. The next day, the fifth of the disease and the fourth from the occurrence of the right iliac pain, the patient died. There was acute peritonitis. In the lower part of the abdomen was a space bounded by the bladder, iliac bones, and small intestine, the latter pushed up and covered by false membrane. In the cavity were nearly three pints of fetid, purulent fluid.

The chief danger from the appendicular peritonitis is that it becomes general. Many of the records mention the time of occurrence, not only of the iliac pain, but also of the subsequent general abdominal pain. The latter is to be regarded as suggestive evidence of the beginning of a general peritonitis, as the former calls immediate attention to the exact nature of the disease. The date of its occurrence is recorded in about one-fourth of the cases of appendicitis, most of which were fatal, while it is noted in but about one-tenth of the cases of typhlitis and perityphlitis, which were nearly all instances of recovery.

General abdominal pain was present on the :

	Appendicitis.	Typhlitis and perityphlitis.
1st day	2 cases.	0 cases.
2d "	11 "	6 "
3d "	21 "	8 "
4th "	12 "	4 "
5th "	8 "	0 "
6th "	5 "	1 "
7th "	5 "	0 "
8th "	4 "	0 "
9th "	2 "	0 "
11th "	3 "	0 "
Total	<hr/> 73 "	<hr/> 19 "

In one of the cases in which this symptom appeared on the first day death occurred on the fourth day. It was stated that there was no perforation of the appendix, although this structure presented a deep purple color and contained a fecal concretion. General peritonitis was present and a considerable quantity of pus was found in the pelvis and vicinity of the appendix. In the other case the general abdominal pain came on three hours after moderate pain in the bowels. It radiated from the right iliac region. In sixty-six hours the patient was dead. The intestines were glued together by a butter-like lymph, but there was no serous or sero-purulent exudation.

It was thought desirable to ascertain the date at which tympanitic distention of the abdomen appeared. At the same time it is recognized that this sign of a general peritonitis is of considerably less value than that already stated.

Tympanites was present on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day	0 cases.	1 case.
2d "	7 "	5 cases.
3d "	13 "	8 "
4th "	14 "	2 "
5th "	3 "	2 "
6th "	1 "	1 "
	<hr/> 38 "	<hr/> 19 "

The second, third, and fourth days are those which include the largest number of cases of beginning general peritonitis. In sixty per cent. of the cases of appendicitis, as inferred from the nature of the pain, and in nearly ninety per cent. as suggested by tympanites. The source of this early peritonitis is to be found in most instances in the escape into the peritoneal cavity of the inflammatory product encysted near the appendix. Although usually small in quantity at this early period, its quality is exceedingly acrid.

The speedy death of the patient almost invariably results from the occurrence of the general peritonitis. In 176 cases the day of death was as follows:

On the 2d day in 8 cases = 4 per cent.		
" 3d " 20 " = 11 "	} 98 in the 1st week, 56 per cent.	
" 4th " 12 " = 7 "		
" 5th " 20 " = 11 "		
" 6th " 16 " = 9 "		
" 7th " 22 " = 12 "		
" 8th " 21 " = 12 "	} 54 in the 2d week, 31 per cent.	
" 9th " 10 " = 6 "		
" 10th " 8 " = 4 "		
" 11th " 6 " = 3 "		
" 12th " 4 " = 2 "		
" 13th " 4 " = 2 "		
" 14th " 1 "		
" 15th " 3 "	} 8 in the 3d week, 4 per cent.	
" 17th " 1 "		
" 18th " 1 "		
" 19th " 1 "		
" 20th " 2 "		
In the 4th week 7 " = 4 "		
" 5th " 4 " = 2 "		
" 7th " 4 " = 2 "		
" 8th " 1 " = $\frac{1}{2}$ "		

In fatal cases sixty-eight per cent., more than two-thirds, die during the first eight days, and two-thirds of these die between the fourth and eighth days inclusive.

Errors in the diagnosis of appendicitis have been numerous, chiefly because the cardinal symptoms of localized pain, general heat, and circumscribed swelling have not been duly appreciated in their defined sequence. Again, the extreme rarity of acute perforating inflammation of the cæcum, as compared with that of the appendix, has not been made sufficiently conspicuous. The acute form of perforating appendicitis has been confounded with inflammation of the cæcum or typhlitis in an exact sense, intestinal obstruction from intussusception or strangulation, pelvic peritonitis (hæmatocele) of vesical, ovarian, tubal, or uterine origin, psoriasis, and renal or biliary colic. More rarely a movable kidney or a foreign body in the bladder has been suspected.

The chronic appendicular peritonitis and the chronic paratyphlitis resulting from a perforated appendix, have been confounded with the results of caries of the spine and hip-joint, suppurative nephritis, intestinal tuberculosis, and cancer of the cæcum. An appreciation of the previous history of the patient, the seat and character of the pain, the period of occurrence of the fever and the date of the appearance of the tumor are necessary for an eliminative diagnosis.

A primary perforating inflammation of the cæcum is extremely rare even in chronic dysentery or in chronic tuberculosis. In an extensive research into the literature of the subject but three cases of acute primary perforation of the cæcum have been found. One from a fish-bone, another from a pin, and the third from strangulation of the bowel. Two cases of rupture of the cæcum are recorded. So rare is the affection in question that the possibility of a primitive, perforating cæcitis may be disregarded. Bartholow's¹ communication on this subject relates rather to the secondary perforation of the cæcum from without.

Stercoral cæcitis, on the contrary, is exceedingly common, and is, perhaps, the most important of all the conditions with which the perforating appendicitis may be confounded. The history of this affection usually makes evident a period of protracted constipation in a person not especially young, vigorous, and apparently healthy, who may have had similar attacks. The pain is trifling for a long time, and the sensitiveness slight. Fever is absent, or of late occurrence. The tumor is present at the beginning as a distinct nodular or doughy mass, elongated, and in the lumbar region. It is unnecessary to say that from a stercoral cæcitis may arise a perforative appendicitis which may end in perforation. Many of the so-called cases of typhlitis terminating in resolution, associated with fecal retention, and persisting after the removal of the feces, are undoubtedly of this nature.

¹ AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1866, N. S., III. 351.

Intestinal obstruction from intussusception or strangulation is characterized by the frequent absence of a suggestive previous history. The pain is not so localized or intense, and the fever is not conspicuous at an early stage. The abdomen is distended and tympanitic at the outset, and is, at the same time, unusually sensitive. Borborygmus and perceptible movements of the intestine are associated with or followed by fecal vomiting. Obstinate constipation and the retention of flatus are noticeable. The tumor is absent when the intestine is strangulated, and it is elongated, sausage-like, usually following the course of the colon when intussusception is present. Tenesmus and the rectal discharge of bloody mucus are important signs of the latter affection, though they may occur when the appendix is inflamed.

As four-fifths of the cases of appendicitis occur in males, and as pelvic peritonitis suggests a doubt as to its diagnosis almost invariably in females, it is evident that the question of sex is of eliminative value in certain cases. But the doubt may arise in the case of the female. Barker¹ has reported two cases, the one of hæmatocele, fatal in forty-eight hours, diagnosticated as inflammation of the appendix. The second patient also died on the second day; the autopsy showed an inflamed appendix and pregnancy, although the patient was supposed to have had a hæmatocele. Suppressed catamenia and the incipient symptoms of appendicitis not infrequently coexist. Again, the occurrence of symptoms of appendicitis within twenty-four hours after delivery is occasional, and more rarely it represents a cause of abortion. In general, the symptoms and progress of a pelvic peritonitis of pelvic origin would not be likely to suggest an inflamed appendix. The symptom which is of the greatest value in determining the onset of an appendicitis after delivery, is to be found in the rapid development of the tumor without an obvious cause. When the appendicular peritonitis is pelvic in its localization, the previous history and the absence of evidence of disease of the genital tract are to be relied upon to direct attention to the appendix as the cause.

An inflammation of the psoas muscle may be the result of an appendicitis. If due to other causes, and acute in character, the digestive disturbance is lacking, and the pain and sensitiveness are less, the tumor is more vaguely defined and tympanitic from its deep seat, while the motion of the leg is early impaired. A primary, acute, suppurative process is of doubtful occurrence.

A biliary colic is rarely likely to suggest an inflamed appendix. The seat and nature of the pain, the absence of fever and peritonitis during the first week, and the possible occurrence of jaundice, would tend to eliminate this affection.

¹ New York Medical Record, 1880, xviii. 663.

In the passage of a renal calculus the seat and character of the pain differ. Fever and the iliac pain are absent. There is no iliac tumor, and the examination of the urine may indicate the probable presence of a foreign body in the ureter.

In chronic cases of inflamed appendix the abscess is evident, and its treatment apparent. It may be mistaken for a psoas abscess of spinal origin. If the latter affection is present, evidence of disease of the vertebræ is usually to be obtained. In disease of the hip-joint the impaired mobility and localized sensitiveness of this articulation will be found more extreme than is apparent in the flexed and adducted thigh, usually connected with a chronic perityphlitic abscess.

The history of the cases of intestinal tuberculosis, chronic suppurative nephritis, and cancer of the cæcum are sufficient to eliminate these causes of iliac and lumbar tumors, when disease of the appendix is under consideration.

Perforating inflammation of the appendix sometimes proves fatal from shock. Death usually follows from the production of a general peritonitis by the direct extension of an appendicular peritonitis, or by the rupture of adhesions producing an intervening, encysted, peritoneal abscess. A general peritonitis may also occur by the intervention of a mesenteric thrombophlebitis and its continuance to the portal vein and liver, with or without portal embolism. Among the 257 cases of perforating appendicitis are 11 of pylephlebitis.

In the protracted cases death may result from exhaustion. Shock proves fatal within the first two days, death from an extended peritonitis within the first week, and from a secondary general peritonitis, as a rule, during the first two weeks.

The termination in resolution of a perforating appendicitis undoubtedly occurs, but our present sources of information give no absolute evidence as to the relative proportion of this class of cases to those ending fatally. The consideration of a large number of cases of typhlitis and perityphlitis, offers a suggestion as to the possible frequency. Of 180 cases thus designated there terminated

By resolution	58 = 32 per cent.
Spontaneous evacuation	33 = 18 “
Operation	89 = 50 “
	<hr/> 180

It will be generally admitted that the spontaneous evacuation of a perityphlitic abscess is an event to be anticipated and guarded against. Apart from the consequent dangers which may result, possible fatal complications which may precede the time of its expected occurrence are a sufficient warning. It is, therefore, important to bear in mind that two-

thirds of the cases of typhlitis and perityphlitis above tabulated, were of unquestioned abscess.

The termination by resolution of nearly one-third may seem a sufficient warranty for recognizing this result as frequent enough to be anticipated in all cases.

That this conclusion is not justified appears from the fact that twelve of these, about one-fifth of the entire number, thus terminated at the end of the second week. Operative interference is demanded before this time in two-thirds of all cases, hence but one-fourth may be expected to undergo resolution.

An additional argument against the plan of waiting with the hope of the occurrence of resolution, is to be found in the frequency of recurrent attacks. Recurrence is recorded to have taken place in 28 out of 257 cases of appendicitis, and in 23 out of 209 cases of typhlitis and perityphlitis; that is, in about eleven per cent. of each. It is at least suggestive of the importance of not waiting too long for resolution, that the number thus terminating during the last two days of the second week is seven per cent. of those ending in resolution. This number may include a considerable part of the recurrent cases which operative interference would have prevented.

The possibility of a termination by resolution must be recognized, and the earliest therapeutic efforts should have this result in view; especially as these efforts also tend toward localizing the peritonitis. But, as Pepper¹ states, "the unjustifiable delay permitted in many cases of typhlitis, whilst hoping day after day for the more definite detection of supuration, is the direct cause of many avoidable deaths."

To keep the bowels quiet should be the first and last thought. Absolute rest in bed, liquid diet in small quantities often repeated, and, above all, sufficient opium to neutralize pain. A sufficiency may seem enormous. Pétrequin² gave a grain of opium every hour till the pain was relieved, with the result of administering 107 grains in six days. Clark³ gave a boy, fourteen years old, 1350 drops of laudanum in one day.

A cathartic or a laxative may be demanded by the patient or friends, and an enema be thought desirable as a diagnostic aid. It is to be remembered that these may be the means of at once exciting a general peritonitis. With⁴ states that in the milder cases the pain disappears in a few days, vomiting ceases, and within five or six days tenderness and distention disappear. The bowels open spontaneously a few days after the discontinuance of the opium. They may remain bound for twenty-four days, yet the general health need not suffer. Recovery may pro-

¹ Ext. Trans. Med. Soc. of Penna., 1883.

³ Amer. Med. Times, 1861, iii. 258.

² Gaz. Méd. de Paris, 1837, 2me S., p. 438.

⁴ Loc. cit.

ceed quietly, steadily, and without disturbance, and the appetite return long before the bowels are opened.

If, after the first twenty-four hours from the onset of the severe pain, the peritonitis is evidently spreading, and the condition of the patient is grave, the question should be entertained of an immediate operation for exposing the appendix and determining its condition with reference to its removal. If any good results are to arise from such treatment it must be applied early. Burchard¹ is an enthusiastic advocate of "lumbar typhlotomy in acute perforating typhlitis." No surgeon would hesitate to give this additional chance for life, were he satisfied that perforation had actually occurred and a general peritonitis was imminent.

If surgical interference is not instituted within the first twenty-four hours after the onset of the sudden and intense right iliac pain, to keep the bowels quiet must still be the injunction. The formation of the tumor, the circumscribing of the peritonitis, is then to be awaited. It is sure to form, in the large majority of cases, if the patient lives long enough. It is only in a small fraction that it occurs before the third day. In more than two-thirds of the cases the contents will escape externally or internally. Without surgical aid the escape is into the peritoneal cavity in most instances, with a rapidly fatal result. In a smaller number the escape elsewhere not infrequently produces serious if not fatal sequels.

Iliac abscesses were sometimes incised before the days of Dupuytren and Grisolle.² The latter writer recommended that they should be opened as soon as fluctuation could be detected, in opposition to the generally prevailing view that nature should take its course. It was left to Mr. Hancock,³ however, to operate before this sign could be recognized. He advocated incision into the tumor in certain stages and forms of mischief, resulting from the presence of impacted feces or foreign substances in either the cæcum or its appendix, which have hitherto, for the most part, invariably proved fatal. He contended that the typhoid condition into which patients affected with peritoneal inflammation fell, did not depend upon the violence of the disease, but upon the effused fluid, the removal of which he thought the only chance of saving the patient. His reasons for operating in the given case are thus stated: "As she was evidently sinking, and the previous treatment had been of no avail, I proposed to make an incision from the spine of the ilium to the inner side of the internal abdominal ring over the hardened spot, so that if it were intestine or omentum it could be freed, or if, as was thought more probable, matter had collected in the right iliac fossa, it could be let out, and thus give our patient a chance for recovery."

¹ N. Y. Med. Journ., 1881, xxxiii. 1.

² Arch. Gén. de Méd., 1839, iv. 314.

³ London Med. Gaz., 1848, N. S., vii. 547.

Some years later Lewis¹ contributed a paper on abscess of the appendix, which included an abstract of forty-seven cases, only one of which recovered. He referred to Hancock's communication, and urged the propriety of opening the tumor in case of threatening urgency even if fluctuation were absent. Willard Parker,² however, deserves the credit of having demonstrated the success of this operation in three out of four cases, and it is his advocacy of an early operation which has produced such favorable results since 1867. He thought surgery useless in the absence of adhesions, but opportune after the fifth day, when their presence is probable and the fear of rupture imminent. He considered that an incision made between the fifth and twelfth days was practicable, safe, and justifiable. Even when the diagnosis was doubtful, "if no abscess had already formed, in case one should be in process of formation, an external opening would tend to make it point in a safe direction, and if no abscess should form, a free incision would relieve tension, thus adding to the comfort of the patient and in no way prejudicing his safety."

In 1873 W. T. Bull³ published an admirable paper on perityphlitis, based upon an analysis of sixty-seven cases thus designated. Thirty-two, nearly forty-eight per cent., terminated fatally, and in fifteen of these there was perforation of the appendix. Noyes,⁴ in 1882, collected a series of one hundred cases of perityphlitis treated by operation, of which eighty were published after the appearance of Parker's paper. Of these fifteen died, fifteen per cent. of the whole. Even this greatly lowered mortality might have been diminished by excluding one case of cancer and another of phthisis. The almost invariable fatality, in Mr. Hancock's time, of cases not terminating in resolution has thus been reduced to less than fifteen per cent. by the general acceptance of a given operation under definite conditions.

In the table⁵ which has been prepared to show the day of death in cases of perforating appendicitis, it appears that 60 out of 176 cases, 34 per cent., died during the first five days. This early mortality is sufficiently explained by the consideration of the table⁶ of symptoms indicating the onset of a general peritonitis. It appears that of 73 cases of general abdominal pain, this symptom appeared during the first five days in 54 instances, 74 per cent. Tympanites was noticed during the same period in 37 out of 38 cases, or 97 per cent. It is thus evident that the earliest date fixed by Dr. Parker is too late to afford the possibility of relief in more than one-fourth of all the cases. But early as this date may seem, it has almost universally been the custom to postpone the time of operating till later in the course of the disease. The following table is based

¹ N. Y. Journ. of Med., 1856, i. 328.

³ N. Y. Med. Journ., 1873, xviii. 240.

⁵ Page 337.

² N. Y. Med. Record, 1867, ii. 25.

⁴ Reprint from Trans R. I. Med. Soc. for 1882-83.

⁶ Page 336.

upon the analysis of 87 cases of typhlitis and perityphlitis. The operation was performed

On the	3d day in	1 case.	}	8	=	9 per cent.
"	5th	" 1 "				
"	6th	" 3 cases.				
"	7th	" 3 "				
"	8th	" 7 "	}	41	=	47 per cent.
"	9th	" 3 "				
"	10th	" 11 "				
"	11th	" 4 "				
"	12th	" 4 "				
"	13th	" 6 "				
"	14th	" 6 "	}	15	=	17 per cent.
"	15th	" 5 "				
"	17th	" 4 "				
"	18th	" 2 "				
"	19th	" 1 case.				
"	20th	" 3 cases.				
After 3d week	.	.	.	23	=	26 per cent.
				87		

Hence, if the indications for operating justified the election of a date as early as the fifth day, they still more justify the choice of the third day.

The result has shown the wisdom of the former step, and the evidence here presented seems not only to warrant, but to demand the latter. It is evident that the operation to be performed is that of opening the abdominal cavity. It is, therefore, unnecessary to state that an act which twenty years ago might have added to the risks of the patient, may at the present time, when properly performed, be confidently expected to reduce them very materially.

That the incision of the tumor, in cases of perityphlitis, is even now frequently omitted, is apparent from the consideration of the cases of inflamed appendix recently recorded. Of 57 cases occurring, for the most part, during the past five years, there were signs of a tumor in 16; an operation was performed in only 7. The tumor was opened in 4 cases, twice successfully. Laparotomy was performed as a last resort in 3 instances, the diagnosis being intestinal obstruction; the cause of the peritonitis was not discovered, and death speedily followed.

Notwithstanding this evidence of a fatal delay in the appropriate treatment of cases of appendicitis, the tendency to the performance of an earlier operation is growing. Bull¹ states that he operated on the third day after the patient was seized with chill, fever, vomiting, and constipation. There were severe right iliac pain and increased resistance on pressure. The aspirator showed pus in the lumbar region, and an

¹ New York Medical Record, 1886, xxix. 267.

abscess was opened behind the colon. Death occurred two days later, and the autopsy showed a perforated appendix, paratyphlitis, and general peritonitis.

Barlow and Godlee¹ made an exploratory incision in the median line on the fifth day. They found early general peritonitis and lymph near the cæcum surrounding a collection of fetid pus, presumably of appendicular origin. A second incision was made over the latter. Recovery took place.

Homans² operated successfully on the sixth day of the disease, probably perforation of the appendix, and the second day after the patient was seen by his physician, Dr. Greene, of Dorchester. The incision was made into the abdominal cavity over the seat of pain. The adherent intestines were separated, and some two ounces of pus removed.

Keen³ also operated on the sixth day after the occurrence of sudden, intense, right iliac pain. Although the symptoms had been characteristic, they were abating. There was increased resistance, however, dullness on deep pressure, a doughy sensation, and considerable œdema in the right iliac fossa. The aspirator showed pus, and a pint was removed after the abscess was opened.

The presence of a general peritonitis does not contraindicate the operation. The case of Barlow and Godlee shows that the general peritonitis may have begun yet the patient recover. Treves⁴ operated upon a case of peritonitis of two days' duration, supervening upon an attack of pelvic peritonitis of some three months' standing. The patient recovered. Mikulicz⁵ operated on the sixth day after the sudden right iliac pain in a case where there was evidence of rupture of the abscess into the general peritoneal cavity on the fourth day. The wound was closed, slight improvement followed, but death occurred on the eleventh day.

If the encysted peritonitis becomes general, death has heretofore been almost inevitable. It is thus obvious that if laparotomy was successful in two out of three cases where a secondary general peritonitis was present, there is more than a chance of recovery by its use even in hitherto necessarily fatal cases. But it should be employed only when suitable, and not as a last resort when patients are moribund.

In conclusion, the following statements seem warranted:

The vital importance of the early recognition of perforating appendicitis is unmistakable.

Its diagnosis, in most cases, is comparatively easy.

Its eventual treatment by laparotomy is generally indispensable.

¹ Medical Times and Gazette, 1885, ii. 852.

² Boston Medical and Surgical Journal, 1886, cxiv. 388.

³ Medical and Surgical Reporter, 1886, liv. 165.

⁴ Medico-Chirurgical Transactions, 1885, 2d series, i. 175.

⁵ Volkmann's Samml. klin. Vortr., 1885, cclxii. 2313.

Urgent symptoms demand immediate exposure of the perforated appendix, after recovery from the shock, and its treatment according to surgical principles.

If delay seems warranted, the resulting abscess, as a rule intraperitoneal, should be incised as soon as it becomes evident. This is usually on the third day after the appearance of the first characteristic symptom of the disease.

BACTERIOLOGY.

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(SECOND PAPER.)

RELATIONS OF BACTERIA TO THE SOIL ON WHICH THEY GROW.

WE have already considered the conditions which favor or hinder the growth of bacteria, and we must now study their mode of nutrition and the changes which take place in the soil in which they are growing. This subject is an extremely complex one owing to the complexity of the chemical substances which are used as food, and the difficulty of ascertaining by analysis the precise changes which have occurred. Hence very little is as yet known about these matters, but there are certain facts which have been made out to which I must shortly allude.

There are two points which have to be considered in this connection, viz.: 1, the assimilation of nutriment by bacteria, the source of their energy, and their respiratory processes; and 2, the products of their growth.

1. As regards the sources of energy; while a small part comes from osmosis, by far the greater part is derived from the processes of intramolecular respiration, the breaking up of complex chemical compounds, probably chiefly of proteids, with the production of CO_2 . Intramolecular respiration may go on with or without the presence of free oxygen, but where free oxygen is present additional energy is obtained from the oxidation of these compounds. In some circumstances, where sufficient energy is not obtained by the intramolecular respiration, changes occur in the nutritive media which do not stand in direct connection with the assimilative processes of the plant, viz., fermentative changes. In the absence of free oxygen the necessary energy is obtained, in many cases, from this fermentative process, and hence the meaning of the fact previously mentioned, that if bacteria are cultivated without oxygen they ought to be grown in a suitable fermentescible material.

The substances which exist in the nutritive material do not enter the

cells without change and then become broken up; they are first assimilated by the protoplasm and converted into compounds suitable for the further changes. In this process, as well as in the processes of growth, a large part of the energy is used up, for assimilation exceeds destruction; in other words, there are constant growth and new formation of protoplasm.

In the process of assimilation it is necessary for the nutritious substances to be in solution in order that they may enter the cells, and with regard to albumen, many bacteria excrete ferments which in the first instance peptonize the insoluble albumen, and thus render it fit for food. Very little is known with regard to the process of assimilation. With regard to the assimilation of carbon compounds, Flüggé¹ says:

"At present only hypotheses are possible as to what is usually the first carbonaceous assimilation product. In the higher plants, which contain chlorophyll, starch is observed as one of the earliest products; in the lower fungi this is, however, apparently altogether absent, except in a few cases (only in some forms of bacilli and leptothrix). From the different nutritive values of the carbon compounds it may perhaps, according to Nägeli, be concluded that the first assimilation product is composed of three carbon atoms with which hydrogen and oxygen atoms are combined, and which are then united with another similar group of three carbon atoms to form a large molecule of six carbon atoms. The more nearly the nutritive materials approach this hypothetical composition, the less difficulty there is in their assimilation, and the more nutritive they are."

As regards the nitrogenous substances, they are usually increased in complexity of structure as the result of assimilation. This is more especially the case with the ammonium salts, which become combined with carbon. The mineral salts also appear to become combined with complex proteid molecules.

The assimilated materials in part go to form new protoplasm and are in part destroyed by the respiratory process.

2. Many of the products resulting from the vital processes of bacteria are of great importance on account of their relation to life and disease. Some of these products are common to all or a number of different bacteria, others are more or less confined to particular kinds. Flüggé gives the following list of the chief products of bacteria:

"Gases, as CO_2 , H_2 , CH_4 , H_2S , NH_3 ; water; sulphur; volatile bodies, such as trimethylamin, alcohol, formic acid, acetic acid, butyric acid; fixed acids, as lactic acid, malic acid, succinic acid, oxalic acid, tartaric acid; sulphoacids, as taurin, amides of the fatty acids, especially leucin, alanin, etc.; bodies of the aromatic series, as tyrosin, phenol, kresol; reduction products, as indol, hydroparacumaric acid; complex molecules, as carbohydrates, pepton, hydrolytic ferments; finally, coloring matters and poisonous alkaloid substances."

Of these, CO_2 , the fatty acids, the amides, and certain aromatic bodies are products common to a number of different bacteria. Carbonic acid

¹ Fermente und Mikroparasiten.

is always given off by bacteria in the process of growth, either as a product of the intramolecular respiration or of oxidation and fermentation. Water and a nitrogenous body are also always present as excretory products. Phenol and other aromatic bodies occur chiefly, and perhaps only, in connection with putrefactive processes.

Among the various results of the growth of bacteria we may refer in detail to three which are of great importance: 1, the production of pigments; 2, the formation of ptomaines; and, 3, the various fermentations.

1. A large number of pigment-forming bacteria are now known, belonging chiefly to the groups of micrococci and bacilli. The color is generally developed only in contact with air; if the bacteria are growing partly in contact with air and partly away from it, the pigment is, in most cases, seen only where the air penetrates. This is easily seen on inoculating a tube of meat jelly with a pigment-forming organism (such as the pink *Torula*) by plunging an infected needle into the substance of the material. Growth occurs in most instances both at the surface and at the deeper parts of the needle-track; but it will be seen in the case of the *torula*, for example, that the color is most intense at the surface, and gradually becomes less and less marked the further away the growth is from the air.

The composition of these pigments varies much. Some are soluble in water, and if a fluid is used as a cultivating medium it becomes tinged throughout; others are insoluble in water, and remain in the gelatinous material which unites the bacteria into zoöglæa masses. As has been previously mentioned, the pigment is not usually present in the interior of the cells, but in some instances the cells appear to be tinged by it, as in *beggiatoa rosea-persicina*, in which the pigment (bacterio-purpurin) appears to be in part inside the cell.

As to the nature of these pigments, almost nothing is known. They seem to be allied to the aniline colors.

These bacteria grow and produce their pigment on a great variety of soils. Of these, the most universally suitable are bread paste and the surface of boiled potato. Cohn has shown that an albuminous soil is not necessary for their development, but that certain forms may grow and produce their pigment in artificial fluids (Cohn's solution) containing ammonia and a carbonate, but no trace of albumen.

The various colors are specific products of specific bacteria. The same bacterium always produces the same material under suitable conditions, and, so far as is known, the material is different in the case of each pigment-forming organism. The intensity and precise shade of the color of the pigment depend on several external circumstances. Reference has already been made to the fact that in many instances oxygen is neces-

sary for the development of the color. In other cases the reaction of the medium is of great importance. Thus the pigment of *Micrococcus prodigiosus* becomes yellowish when an alkali is added, but the red color at once appears when the material becomes acid. This difference of color, according to the reaction of the medium, is well seen in *Bacillus cyanogenus* (the bacillus of milk), where the blue color is only developed if the milk is acid. It is not, however, necessary, in most cases, that the reaction of the material should always be in the first instance that most suited for the development of the pigment. Thus *Micrococcus prodigiosus* produces its red pigment on soils which are not themselves acid. This is due to the fact that the micrococci not only produce a pigment, but also an acid. The following are some of the chief pigment-producing bacteria:

*Micrococcus prodigiosus*¹ is the one which is perhaps best known. It produces a brilliant blood-red color, and frequently appears on bread and other material containing starch, giving rise to the phenomenon of the bleeding host. It also at times grows in milk, which likewise becomes red; an appearance formerly referred to many causes, more especially to a diseased state of the cow, but in reality due to the growth of this organism in the milk after it leaves the body of the animal. The pigment is insoluble in water, and is present either in the glutinous material that unites the bacteria into zoöglæa masses, or in the substratum in which the organisms are growing; the cells themselves are colorless. It is soluble in alcohol and ether. Alkalies turn the color to yellow; acids produce a deep carmine-red tint.

Micrococcus luteus is a very common organism, and frequently appears in the form of yellow drops on the cut surface of boiled potato exposed to the air for a short time. This coloring matter is also insoluble in water, and is apparently contained in the glutinous connecting material.

A number of other micrococci which produce pigments are known, but beyond the fact of this pigment production, very little interest attaches to most of them. Such are *Micrococcus aurantiacus* (Schröter), giving rise to an orange-yellow color, soluble in water. *Micrococcus chlorinus*, producing a greenish-yellow color, soluble in water; acid destroys the color; the material in which it grows becomes strongly alkaline. *Micrococcus cyaneus* (Cohn and Schröter), causing an intense blue coloration, soluble in water; the color resembles closely that of litmus, and, like it, becomes red with acids, and blue with alkalies. *Micrococcus violaceus* (Schröter), forming a violet color, also soluble in water. *Micrococcus fulvus*, producing a rusty-red color. In addition to these, are other unnamed micrococci which also produce pigment.

Various sarcinæ give rise to pigments. One, which liquefies gelatine,

¹ This organism ought really to be reckoned among the bacilli, but it has been so long known under the name "*micrococcus*" that it is perhaps better to retain that designation.

produces a golden-yellow pigment; another, which does not liquefy gelatine, gives rise to a citron-yellow pigment; and a third forms a delicate pink.

Certain pathogenic micrococci also produce pigment. Of these the chief are: *Staphylococcus pyogenes aureus*, giving an orange-yellow color; *Staphylococcus pyogenes citreus*, giving a citron-yellow color; and *Staphylococcus cereus flavus*, giving a yellow color.

Among the bacilli, also, a considerable number produce pigments. Of these the following may be mentioned: *Bacillus prodigiosus*, referred to already under the name *Micrococcus prodigiosus*. *Bacillus indicus*, which was found by Koch in the intestinal contents of a monkey in India; it produces a scarlet color, which becomes blood-red on the addition of ammonia, but regains its scarlet tinge when acetic acid is added. *Bacillus synecyanum*, commonly known as the bacillus of blue milk, which produces a grayish-blue coloring matter. Under the influence of its growth milk becomes of an indigo-blue color. When it grows in pure milk the latter becomes distinctly alkaline, and the color is a slate-gray or pale blue. If, however, the lactic fermentation is going on at the same time, or if acid be added, the intense deep blue color is obtained. For the production of this color, the presence of oxygen or oxidizing agents appear to be necessary. The source of the pigment seems to be, according to Hueppe's researches, the casein, and not the sugar. *Bacillus ruber*, which produces a scarlet color, like that of red sealing-wax. A bacillus is sometimes found in water which produces a beautiful dark violet color (*Bacillus violaceus*) in contact with the air. A dirty red color is also formed by *Bacillus erythrosporus* (Cohn), which is occasionally obtained from the air. *Bacillus pyocyaneus* is the cause of the blue pus occasionally seen in wounds. It produces a greenish-blue color. The pigment can be extracted from the pus by means of chloroform, and in neutral fluids gives a blue color. If the water is acid, the color is red. It thus resembles litmus, and the pigment is called by Fordos *pyocyanin*. Various other bacilli have been obtained from water and air, producing greenish, red, and fluorescing pigments. *Clathrocystis roseo-persicina* (beggiatoa roseo-persicina, Zopf; *Bacterium rubescens*, Lankester) produces a peach-colored pigment, investigated by Ray Lankester, and called by him *Bacterio-purpurin*. The pigment is insoluble in water and alcohol, and is apparently contained in the cells. The spectrum of this pigment, as described by Lankester, differs from that produced by the *Micrococcus prodigiosus* and other pigment bacteria. This organism is found in water in which dead animals are putrefying, in marshes, etc.

Some pathogenic bacilli also produce pigment when growing in various substances, especially on potato. Among these are the *bacillus of glanders*, which gives rise to brownish deposits on potato; the *cholera bacillus*, which, at the temperature of the human body, grows on potato

in the form of a grayish-brown layer; *Bacillus alvei*, which produces a yellow color; and the *bacillus of vagus pneumonia* (Jens Schou), the colonies of which on potato have a reddish hue.

Certain other closely allied forms of microorganisms also form pigment, of which may be mentioned various forms of *Torula*: a *Torula* producing a pink color in contact with the air, a black *Torula*, and a yellow *Torula*.

2. Much more important than these pigments are the alkaloid products formed by certain bacteria as the result of their growth in albuminous materials. These have, as yet, been but little investigated on account of the small quantity present and the difficulty of isolating them from the other materials in which they are found. It is only those which occur in putrefying materials which have been isolated, and it has not yet been ascertained what special form of bacterium produces each, or whether the same substance may result from the growth of different kinds of bacteria. It is, however, most probable that, just as in the case of the pigment bacteria, each species of bacteria always gives rise to the same set of products under suitable conditions. It has been long known (since Panum's classical researches) that putrefying materials often contain a chemical poison which, when introduced in sufficient quantity, kills certain animals. Panum found that where a large quantity of putrefying material was injected at one time into animals, death rapidly followed with symptoms of poisoning. To show that this result was independent of the growth of bacteria in the living body, he boiled the fluids for several hours, thus killing all the bacteria; nevertheless, the fluids retained their poisonous qualities, though not to such a degree as before this prolonged boiling. In another experiment he filtered the fluid, boiled it for an hour, evaporated to dryness, digested it with absolute alcohol, and then treated the residue with boiling water, when he found that this watery extract was also poisonous. Since that time various attempts have been made to isolate and analyze these poisonous bodies, but up till quite recently the results have not been satisfactory. Brieger has, however, succeeded in demonstrating the existence of a number of alkaloid substances in decomposing materials and in determining their chemical constitution. As this matter is of great importance, it will be necessary to give some details of Brieger's work.¹

The name given to these bodies is *cadaveric alkaloids* or *ptomaines* (from πτώμα, a corpse), and although this term was at first applied only to the bodies formed during putrefaction, more especially during the decomposition of corpses, it is now applied to all the basic alkaloid bodies produced by bacteria. In his early researches Brieger investigated the ptomaines formed during the decomposition of flesh, fish, cheese, and

¹ "Über Ptomaine," von Prof. L. Brieger, 1885, and "Weitere Untersuchungen über Ptomaine," 1885.

gelatine; in his "further investigations" he deals with the ptomaines found in decomposing human cadavers. These two researches were preliminary to the most important part of these investigations, on which, however, he only touches in these works, viz., the study of the special ptomaines formed by the different species of bacteria, more especially by the pathogenic forms.

Without going into details as to the methods adopted in isolating the various bodies, the leading processes used in his researches on the cadaveric alkaloids may be briefly indicated. Hydrochloric acid was first carefully added to the materials in order to convert the alkaloids into chlorides, in which form they are not easily destroyed. This mixture was then evaporated to a thick syrup and the ptomaine chlorides extracted by means of absolute alcohol. The extract was evaporated and again extracted with absolute alcohol, and this process was repeated several times. In this way those bases which were not readily soluble in alcohol (such as neuridin) were obtained. To the alcoholic solution was then added an excess of an alcoholic solution of bichloride of mercury, and this mixture was allowed to stand for twenty-four hours. The precipitate formed was then boiled in a large quantity of water and filtered. Thus the peptones and albuminates which, after this treatment, were insoluble in water were entirely removed, while the compounds of mercury and ptomaines were soluble in boiling water. On standing, certain of the less soluble bodies (the cholin) crystallized out. By means of sulphuretted hydrogen the mercury was then removed from the solution and the ptomaine chlorides left behind in the fluid; this fluid was evaporated and the residue washed with alcohol, when some alkaloids were dissolved in the alcohol and others were left behind. The dissolved alkaloids were then obtained by the addition of platinic chloride, ptomaine platinochlorides being formed. The processes, however, vary for each base, so that it is not possible to go into details here on these matters.

From meat minced up, mixed with water and allowed to putrefy for five or six days, at the body temperature, several alkaloids can be extracted. The one present in largest amount is called by Brieger *neuridin*, and has the formula $C_5H_{14}N_2$. This body, as will presently be seen, is very constantly present in putrefying materials. It is not poisonous. It can be split into equal parts of dimethylamin and trimethylamin. From the fact that this decomposition shows the close relation of this substance to neurin, the name *neuridin* was chosen. After removal of the neuridin the remnant is found to be poisonous, and from this the poisonous base *neurin* has been extracted. Another material is also found under the same circumstances, viz., *cholin*. Neurin and cholin have been held by a number of authors to be identical bodies, but Brieger finds that they are different, and holds that neurin ($C_5H_{13}NO$)

is derived from cholin ($C_5H_{15}NO_2$) by the removal of a molecule of water from the latter as the result of the action of the putrefactive bacteria. On animals their effects are different, both of them producing symptoms like those caused by muscarin, but differing much in the dose, ten times more of the cholin chloride being required to kill animals than of the neurin chloride.

In decomposing fish (herring and torsk) neuridin was again found in large quantities, also a poisonous base closely allied to *æthylen-diamin* ($C_2H_4(NH_2)_2H_3O$), but afterward found to differ from it; further, *muscarin* ($C_5H_{15}NO_3$), a base previously found by Schmiedeberg and Koppe, and ascertained by them to be the poisonous agent in a disease of flies caused by fungi (*agaricus muscarius*), and a new non-poisonous alkaloid to which the name of *gadinin* ($C_7H_{17}NO_2$) was given. In putrefying cheese neuridin and trimethylamin were found. From putrefying gelatine were obtained neuridin, muscarin, and dimethylamin. From fresh brain, cholin and neuridin were obtained (but not neurin). Neuridin cannot be got from the other fresh tissues of the body.

Of the various bases found in putrefying materials (neuridin, neurin, muscarin, a body closely allied to *æthylen-diamin*, gadinin, trimethylamin, triethylamin, and dimethylamin), neuridin is the one which is most constantly present at the commencement of putrefaction. The formation of the others depends to a considerable extent on the materials employed; thus neurin was found only in decomposing meat; muscarin, gadinin, trimethylamin, and the body allied to *æthylen-diamin* occurred in putrefying fish, and dimethylamin only in putrefying gelatine and putrid yeast.

From decomposing human cadavers the following bodies were isolated: cholin, neuridin, cadaverin ($C_5H_{16}N_2$), putrescin ($C_4H_{12}N_2$), saprin ($C_5H_{16}N_2$), trimethylamin ($(CH_3)_3N$), and mydalein. Of these, cholin and trimethylamin are poisonous in large doses, but mydalein is intensely poisonous, and another base, which was not analyzed, is also noxious. Which of these bodies is present depends greatly on the stage of decomposition. In bodies kept in the cold for twenty-four to forty-eight hours only cholin was present. If the putrefaction had gone on for three days at a warmer temperature, there was less cholin, and neuridin had appeared. After seven days the cholin disappeared entirely, and neuridin and trimethylamin were present. In fourteen days to three weeks new bases were found, and neuridin could no longer be detected. These new bases are, cadaverin, which increases in amount as putrefaction goes on, putrescin, saprin, and the two poisonous bases mentioned before, viz., mydalein and the other unnamed one.

The part of these results which interests us most as medical men is that in which the presence of poisonous alkaloids among the products of bacteria is demonstrated. The poisonous bodies isolated by Brieger

were cholin, neurin, muscarin, a body closely allied to æthylen-diamin, trimethylamin, mydalein, and another body of undetermined composition.

Neurin chloride injected into the lymph-sac of a frog, in doses of two to five milligrammes, produces in two to five minutes a paralytic condition; the animal at first reacts on mechanical or chemical stimuli, and reflex action persists to a slight extent for some time. Immediately after the injection the heart beats a little more slowly and more energetically, gradually the relative length of diastole increases, the interval between the beat becomes longer, and arrest occurs in diastole. Atropia often restores the heart's action, and frogs under the influence of atropia generally withstand the action of this toxic substance. Large frogs react slowly, and recover if the dose is one milligramme, but two milligrammes always kill. Of the lower animals, cats are most easily affected. For rabbits the subcutaneous injection of a dose of 0.005 gramme per kilo. of the body weight is necessary to cause the symptoms of poisoning, and a dose of 0.04 gramme per kilo. is required to cause death. Its injection is followed by the appearance of moisture about the nostrils and upper lip, then by profuse salivation, and later by increased secretion from the nose and the lachrymal apparatus. The respirations are quicker and labored, but toward the end they become slower, irregular, and superficial. At first the heart's action is very rapid and strong, but it very soon becomes slow and weak, and the heart stops in diastole. There is often marked contraction of the pupils after subcutaneous injection. This effect is always produced by dropping the solution into the eye. There are increased peristalsis and constant passage of feces; also emission of semen and passage of urine. When fatal doses are employed, there are clonic contractions of the muscles, accompanied by great weakness of the extremities. Atropia is a very active antidote even at a late period, but it does not act as a prophylactic in the case of rabbits. If the poison is administered by the mouth, ten times more is required than by subcutaneous injection.

These symptoms are identical with those produced by muscarin which, likewise, causes in rabbits salivation and flow of tears, contraction of the pupils, profuse diarrhœa, emission of semen, and passage of urine, till finally the animals die with cramps.

Cholin chloride produces symptoms similar to those caused by neurin, but much larger quantities are required, 0.1 gramme per kilogramme of body weight being required to produce the same effect as 5 milligrammes of neurin chloride, and the fatal dose of cholin for rabbits is 0.5 gramme per kilo., or almost ten times the dose of neurin.

The base allied to æthylen-diamin is also poisonous, but is not so violent in its effects as neurin. Even after the injection of large doses into the lymph-sac of a frog there are no effects evident at first; after a time,

however, the animal may become lethargic but is easily roused. This is followed by increased respiratory action; the pupils dilate, and the animal dies in some hours without any special symptoms. The heart stops in diastole. In mice and guinea-pigs the effects are more marked. Within a short time after the injection of small doses there is profuse secretion from the nose, mouth, and eyes; dilatation of the pupil and exophthalmos. Then there is violent dyspnœa, which often lasts till the death of the animal several hours (sometimes twenty-four) after the injection. Small doses had no immediate marked effect on rabbits beyond a transient and slight salivation and increased frequency of respiration, but several of these animals were found dead after twelve to twenty-four hours.

The action of mydalein, which is also apparently a diamine, is very characteristic. Small doses injected into rabbits and guinea-pigs produce, very quickly, increased secretion from nose, mouth, and eyes, dilated pupils, injection of the vessels of the ear, rise of temperature of 1° or 2° C., and at times shivering. By and by, these symptoms pass off and the animal recovers. If large doses (about one-half of a centigramme) are injected into a guinea-pig, the effect is very violent and always ends in the death of the animal. The secretion from the organs provided with smooth muscular fibres is extremely profuse, the saliva and feces mingle so that the animal always lies in a wet mess, more especially as locomotion is interfered with. Exophthalmos occurs, the dilated pupils are difficult to examine on account of the secretion from the lachrymal glands (this secretion is white and turbid). When the action of the poison has reached its height the animal falls down, because first the hind and then the front extremities become paralyzed; there are fibrillary twitchings in the different groups of muscles; respiration becomes more and more labored and panting, at times the animal leaps up gasping for air, raises its head and then again sinks down and lies in its feces, making slight movements with its limbs. The temperature gradually falls, the movements become weaker and weaker, and finally the animal dies. On post-mortem examination the heart is found to have been arrested in diastole, the intestine and bladder are contracted, but otherwise there is nothing abnormal.

The other poisonous substance obtained from putrefying human cadavers caused increased intestinal peristalsis in guinea-pigs and rabbits which lasted several days, and, on account of the continued evacuations, led to great weakness of the animal. Beyond this, no abnormal effect was noticed.

Brieger mentions a few preliminary attempts which he has made to search for ptomaines among the products of pure cultivations of the pathogenic bacteria. These have not yet led to any definite result. Friedländer's pneumococcus breaks up carbohydrates into formic acid,

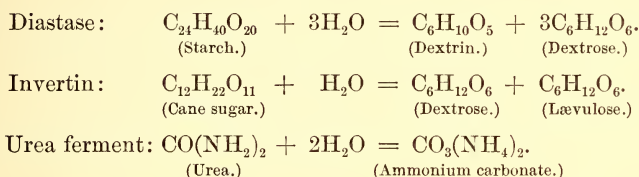
acetic acid, and ethyl-alcohol; Brieger's bacillus, which was obtained from human feces and which kills guinea-pigs, gives propionic acid as the chief product of its growth in grape sugar.

The typhoid bacilli give considerable quantities of ethyl-alcohol and small quantities of volatile fatty acids, more especially acetic acid. They break up grape sugar into lactic acid. Brieger was also able to obtain from their cultivations in meat infusion a new ptomaine, small quantities of which produced marked effects on guinea-pigs. There were slight salivation and increased frequency of respiration. The animals lost control over the muscles of the extremities and back, without, however, the occurrence of any true paralysis; the pupils become dilated and ceased to react to light. There was also profuse diarrhœa, and the animals died in twenty-four to forty-eight hours. On post-mortem examination the heart was found strongly contracted, the lungs hyperæmic, the remaining internal organs pale, the intestine firmly contracted and its walls pale. This substance was probably a ptomaine, but its exact composition was not definitely made out. From cultivations of *Staphylococcus pyogenes aureus* a new ptomaine was also obtained, which, however, was apparently not poisonous.

Not the least important of the results of the growth of micro-organisms are the ferments and the products of fermentation.

A number of microorganisms produce small quantities of substances which act as ferments in the same way as ptyalin, pepsin, trypsin, etc., act. This substance, the so-called chemical ferment, gives rise to fermentative changes, a very small quantity of the ferment being capable of causing alteration in a large quantity of material. These ferments are necessary agents in the nutrition of many microorganisms, converting substances which are unsuitable for food into easily assimilable materials. Of these we must note more especially the diastatic and the peptonizing ferments. Diastase converts starch into glucose in faintly acid solutions. It is excreted more especially by the *Bacillus butyricus*. Invertin is produced constantly by the ordinary *Torula cerevisiæ*, and converts cane sugar into glucose (dextrose and lævulose). The common yeast plant cannot assimilate cane sugar, but nevertheless it grows readily in solutions containing it, this ferment being produced and rapidly converting the cane sugar into glucose, which is then easily acted on. Certain bacteria (*e. g.*, *Bacillus amylobacter*) produce ferments which convert cellulose into glucose, and others which convert milk sugar into the same substance. The peptonizing ferment converts albuminous substances into peptones and is produced by various bacteria, more especially by the putrefactive organisms. There are other ferments less frequently found, some of which act on fat, converting it into fatty acids and glycerine, others on amides, etc. In the case of the fermentation of urea a chemical ferment has been isolated as a product of the micrococci

which are apparently the causes of the ammoniacal fermentation of urine. These bodies appear to have a hydrolytic action; they enable the molecule acted on to take up one or more molecules of water and then cause it to split up into two or more complex molecules without undergoing any alteration themselves. There is, however, a limit to the amount of material on which they can act, diastase, for example, being able at most to convert 2000 times its weight of starch into glucose. Flügge gives the following hypothetical formula of the action of these bodies:



Differing from these chemical fermentations in many ways are the fermentations caused by many forms of bacteria. They result in much more extensive and continuous changes in the fermentescible material, these changes being, as a rule, only brought about by one special form of microörganism. In some cases, however, various different organisms set up a similar process, though there is generally only one form which acts to a very marked extent. How these changes are brought about is not known, and probably the process differs in different instances. In any case, there is no doubt that the changes are due to the growth of living organisms, and not, independently of the organisms, to oxidization, molecular change, etc., as was formerly supposed. The evidence in favor of this statement is so strong and so well known that it is unnecessary to discuss it.

Various views have been propounded at different times to explain the action of the microörganisms. It might, for example, be supposed that these plants act by producing hydrolytic ferments which split up the fermentescible material in the manner before described. The only instance, however, in which the existence of such a substance has been demonstrated is in the case of the ammoniacal fermentation of urine. This has been shown to be due to the growth of an organism in the urine—the *Micrococcus ureæ* (Cohn)—and not to the vesical mucus, as was formerly supposed. Musculus demonstrated that by adding absolute alcohol to ammoniacal urine, a precipitate was obtained which could be filtered and dried. This precipitate transformed urea into carbonate of ammonia.¹ These results have been confirmed by Lea, of Cambridge. According to Pasteur, the cause of the fermentation is not the production of a ferment, but the breaking up of the chemical compounds by the

¹ Bacteria, Magnin.

growing plants in their search for nutriment, more especially for oxygen. Again, one might suppose that the organisms while living in various substances feed on them, and the products of the fermentation may be either the portion of the food which has been rejected by them, or products formed in and excreted by the organisms. There is, however, a considerable amount of evidence that the changes often occur outside the cells altogether. Nägeli has pointed this out with reference to the frequent formation of acetic ether in connection with alcoholic fermentation. Acetic ether can only be formed when acetic acid and alcohol are both in the nascent state. As these bodies do not result from the growth of the same organism, but of different organisms, it follows that they combine outside the cells, and that therefore the acetic acid and alcohol are nascent—in other words, are being formed outside the cells. Nägeli's theory is that "fermentation takes place in this way, that as the result of the intramolecular activity in the protoplasm intense movements are set up, and that outside the cells there are chemical molecules which are set into active motion by these movements, so that breaking up of these molecules results."¹ In all probability fermentation occurs in different ways in different cases. In any case, the fermentative action is a process distinct from the intramolecular respiration, and goes on alongside of it. Hence in the resulting material there are found not only the products of the fermentation but also the products of the life of the plant, though the former are present in enormously larger quantities than the latter.

As to the chemical changes which occur in fermentation, Hoppe-Seyler (see Flügge) makes the following suggestion :

"In all cases carbonic acid is produced; for this, new combinations between carbon and oxygen are necessary, and these are rendered possible by the breaking up of the existing union between oxygen and hydrogen, carbon and hydrogen, and carbon and carbon. In the fermentation of formic acid, $\text{H}-\text{C}\begin{smallmatrix} \nearrow \text{O} \\ \searrow \text{O}-\text{H} \end{smallmatrix}$, the union between the oxygen and hydrogen atoms in the hydroxyl group, and also the union between the hydrogen and carbon atoms is broken, the free hand of the oxygen atom attaches itself to that of the carbon atom, the hydrogen atoms unite, and thus we have H_2 and CO_2 . In a similar manner in all fermentations there is a wandering of the oxygen atom from hydrogen to carbon, the point of attachment of the oxygen atom to the carbon one being obtained by the dissolution of the union between carbon and hydrogen and carbon and carbon. In short, the group carboxyl is formed, while, on the other hand, reducing compounds of hydrogen with hydrogen or carbon with hydrogen appear. . . . Nevertheless, the wandering of the oxygen atom which leads to the breaking up of the molecule only occurs when the molecule is not too large in relation to the number of displaceable carbon atoms. If there are numerous carbon atoms in union with one another while only one OH group is present, as in many benzol derivatives, in the higher fatty acids, etc., which can go to form carboxyl, then no such change occurs in the molecule; on the other hand, this change is possible when there are several oxygen atoms which can form new carbon compounds, as in the fer-

¹ Quoted from Flügge, *op. cit.*

mentation of glucose, where three carboxyl groups are present in each molecule. In the case of acetic acid, fermentation only occurs with difficulty for this reason, and in propionic acid it is still more difficult, for here, as in formic acid, there is only one oxygen atom free to form a carboxyl group, while the molecule is decidedly larger than that of formic acid; on the other hand, fermentation occurs much more easily in the case of the oxyacids (glycocholic acid, lactic acid, etc.), because in these there is a second hydroxyl group, and thus a second displaceable oxygen atom. Consequently, the following are not fermentescible substances: carbonic acid, amines which contain no oxygen; further, the large molecules of the higher fatty acids and the benzol derivatives which are not rich in oxygen. On the other hand, the following must be fermentescible: the higher alcohols, the lower fatty acids down to propionic acid, the oxyacids, and the multibasic acids of the fatty series, the carbohydrates, and the proteids."

The first fermentative change which was demonstrated to be due to the growth of living organisms is the alcoholic fermentation of sugar. I have previously referred to experiments which showed that the unboiled juice of the grape could be preserved without undergoing fermentation if taken from the grape and kept with certain precautions. Pasteur's experiments led him to the following conclusions:

"The boiled juice of the grape never ferments when kept in contact with air which has been deprived of the germs suspended in it.

"Boiled grape juice ferments when a very small quantity of water is introduced, in which the surface of the grape and the branches of the vine have been washed.

"Grape juice does not ferment after the introduction of this water if the latter has been previously boiled and allowed to cool.

"Grape juice does not ferment when a small quantity of the juice taken from the interior of a living grape is added to it."

On the other hand, grape juice does ferment if certain microorganisms be introduced, the sugar being converted into alcohol, carbonic acid, and other products. The special organism which produces this change is the yeast plant, or *Torula cerevisiæ*. Other forms of *torulæ* also set up the change, though to a much less extent, as well as some of the lower fungi, such as the *Mucor racemosus*, when free oxygen is absent. The latter is, however, not a true fermentation, but rather the result of the intramolecular respiration of the plants. Cane sugar cannot undergo this fermentation; it must first be converted into dextrose and lævulose. This is done by means of the invertin formed by the *torulæ*.

The chemical change which occurs is much more complex than was at first supposed, because not only are alcohol and carbonic acid produced, but also small quantities of glycerine, succinic acid, and often traces of acetic acid, amyl-alcohol, etc. These by-products apparently also owe their origin to the *torulæ*, and show that the fermentative change is probably a very complex one. The fermenting fluid must not contain too much sugar, otherwise the *torulæ* cannot grow; thirty-five per cent. of sugar is said to be the highest limit. The growth and fermentation also cease when the amount of alcohol in the fluid has reached 12 to 14 per cent. Of the sugar broken up, 95 per cent. appears as alcohol and

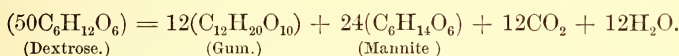
carbonic acid, $2\frac{1}{2}$ to $3\frac{1}{2}$ per cent. appears as glycerine, and 0.4 to 0.7 per cent. as succinic acid.

The lactic acid fermentation is due to a small bacillus, the *Bacterium lactis* (Lister). These bacteria are very short, thick cells, about half as long again as they are broad; when unstained they seem to be oval bodies. They are generally arranged in pairs, sometimes they are in chains. They are constantly found along with a great variety of other microorganisms in milk got from a dairy, and they increase in number as the milk becomes sour. They have been separated from the other bacteria and cultivated pure in various infusions, in nutrient jelly, etc., and their introduction into sterilized milk is followed by souring and coagulation of the milk due to the lactic fermentation. Though this is the chief organism which causes lactic fermentation, a number of other organisms, such as the typhoid bacillus, produce small quantities of lactic acid when grown in solutions containing grape sugar. The *Bacterium lactis* can cause fermentation in solutions of cane sugar, and therefore it is supposed that it forms a ferment which transforms the cane sugar into glucose, but this ferment has not yet been isolated. The precise changes that occur in the glucose have not been made out. A very large proportion is converted into lactic acid, but beside lactic acid there is always the development of carbonic acid gas, and there are also other by-products which have not yet been thoroughly investigated. When a certain and not very large quantity of lactic acid has been produced, the growth of the organisms, and consequently the fermentation, ceases. But if chalk be added to the milk, the lactic acid is neutralized, lactate of lime being formed, and much larger quantities of lactic acid are obtained.

The butyric acid fermentation is also due to a bacillus which is longer and larger than the *Bacterium lactis*. Pasteur thought that these bacilli could only cause the butyric fermentation in the absence of free oxygen; indeed, he went further and thought that oxygen killed them. This is, however, not the opinion of more recent investigators, more especially of Hueppe. Hueppe finds that these organisms can grow in milk and set up fermentation under conditions which have nothing to do with the presence or absence of free oxygen, and that the conditions in relation to air under which they act in producing fermentation are precisely the same as those of other bacteria. If sterilized milk be inoculated with a pure cultivation of this bacillus and kept at the body temperature, in two days a clear, somewhat yellowish fluid may be seen under the layer of cream. This fluid increases in amount as time goes on. At the bottom of the vessel is the coagulated casein, but after a time this coagulum becomes dissolved and peptonized, and then further broken up by the bacilli. According to Fitz, after ten days fermentation in an artificial cultivating fluid containing 100 grammes of starch there are

formed 34.7 grammes of butyric acid, 5.1 grammes of acetic acid, 0.33 gramme of succinic acid, and 1 gramme of ethylic alcohol.

The facts as to the viscous fermentation of sugar are not so well known, but, according to Pasteur, the microorganism at work is a micrococcus. The fermenting fluids become viscous, so that they can be drawn out in long threads. The change which occurs is that the sugar becomes transformed into a form of gum, mannite, and carbonic acid. According to Flügge, 100 parts of sugar give 51.1 parts of mannite, 45.5 parts of gum, and 6.2 parts of carbonic acid, and he explains this change by the following formula:



The alkaline fermentation in urine has already been referred to in connection with the subject of chemical fermentations. It is apparently due to a micrococcus (*Micrococcus ureæ*), and the breaking up of the urea into carbonate of ammonia and water seems to be the result of the action of a chemical ferment formed by these organisms. That this change is really dependent on microorganisms, and not on the bladder mucus, is shown by the experiments in which normal urine is taken from the bladder with precautions against contamination, this urine, though unboiled, remaining for an indefinite time unaltered. Among the most striking experiments in this direction are those of Cazeneuve and Livon,¹ of which the following is an example: Remove the urinary bladder from the body of an animal, dip it for a few seconds into paraffin at 100° C., so as to destroy any living organisms which may have fallen on its wall, then plunge it into paraffin at 45° C., so as to get a thicker coat, and then hang it up. Even after three days it will be found that the fluid which has exuded from the bladder into the paraffin cup is clear, acid, and devoid of organisms. Remove the cup and expose the bladder to the air for a few hours, then give it a new coating of paraffin at 45° C. (which will not kill the germs which have fallen on the bladder during the exposure), and leave it again for three days. The fluid outside the bladder will then be found to be ammoniacal and to contain organisms. Similar results were obtained when the urine had been previously rendered alkaline by the administration of soda or potash.

The acetic fermentation is the conversion of alcohol into acetic acid, and is brought about chiefly by a small bacillus which grows on the surface of the fluid and forms dense, compact zoöglæa masses. This organism develops best in fluids containing a small quantity (one or two per cent.) of acetic acid, and there must not be too much alcohol present (at most ten per cent.).

¹ Revue Mensuelle, 1877, p. 733.

The putrefactive fermentation is a very complex change, and one about which very little is known, except that it is caused by the growth of microorganisms in the putrefying material. Probably there are a number of different fermentative processes occurring singly or together, which are accompanied by the development of a putrid smell. Nor has much been made out as to the microorganisms concerned in the process. Pasteur's researches led him to the view that, when a substance putrefies, two classes of microscopic organisms are at work—the first, in point of time, abstracting the free oxygen from the material; and the second, which then appear, being unable to live in free oxygen, but nevertheless requiring oxygen for their growth, obtaining it from the chemical compounds present. The result of this extraction of oxygen is the breaking up of these compounds and the rearrangement of their elements to form new compounds which constitute the products of putrefaction. Later observations have thrown doubt on the accuracy of this theory, and the probability seems to be that the organisms which produce putrefaction act as well in the presence of air as do the other fermentative organisms. Rosenbach¹ has found three different organisms which produce a putrid odor, and one of these is, he thinks, the common agent in this change. This organism, which he calls *Bacillus saprogenes*, No. 1, was obtained in the first instance from the air of a hospital ward, and produces an intensely putrid odor. It is a comparatively large bacillus, often containing a spore at one end, and it grows readily in a number of media. If inoculated on a mixture of water and egg albumen, free access of air being permitted, it breaks up the albumen rapidly, the fluid becomes greenish-yellow, and when the flask is opened a horribly offensive odor is perceived. If cultivated without oxygen, it causes hardly any putrefactive change in the material. A second bacillus which Rosenbach obtained produces a somewhat different smell, and acts somewhat more vigorously in the absence of oxygen than does No. 1. Although there may be only one or two organisms which produce the foul smell of putrefying material, there is no doubt that a large number of different species of organisms take part in the whole process of the destruction of albuminous materials. Probably, also, the presence of plenty of oxygen leads to the rapid destruction of the foul-smelling products, and to the more rapid and complete oxidation of the material. Flügge suggests the following as the course of events in the putrefactive process: When bacteria gain access to a putrescible medium, they at first increase in number, often with the formation of peptonizing ferments. The soluble albumen formed by means of these ferments then undergoes decomposition, which most probably occurs in this way, viz., that amido-derivatives of the fatty series (especially amido-acids), nitrogenous bodies of the

¹ Microorganismen bei den Wundinfektionskrankheiten des Menschen.

The knowledge on which our reëxamination of muscular conditions in ataxia is founded is very recent. However unfamiliar it may now be, like much other medical knowledge it will soon become common property, if once it be recognized as useful.

It will be necessary to state sharply the facts and inferences on which our research rests, in order that a clear comprehension of the analysis of the muscular failures in ataxia may be obtained.

Nothing can be more valuable to the physician than to know clearly the relative readiness with which a centre acts, a nerve carries its mandates, or a muscle responds to various forms of excitation.

Whether a muscle acts rapidly and completely when the nerve-force, volitional or reflex, calls upon it, or is inert and slow and incomplete in moving, would probably be one of our best tests of local or general health. The analysis of the quality of muscular reaction escapes us, in a measure. It may not always do so.

It is possible, however, to test muscle and nerve states by the study of coarser agents, and of these there are but two—electricity and mechanical excitation. The first gives us information of value, but, strangely enough, is to be regarded as a ruder agent than the other, and in some ways inapplicable beyond a certain point.

The mechanical excitation of muscle began to have value when, in 1875, Westphal described the diagnostic use of what we now call knee-jerk, and what is usually known as tendon reflex.

That the knee phenomenon is a direct muscle response, and not a true reflex, is now little questioned.

In 1883 Jendrassik¹ showed that violent exertion, as lifting weights, clenching the fists, increased the response to a blow on the patellar tendon. No addition was made to this inviting discovery until we added a collection of facts, which are certainly of interest, and which seem likely to prove also valuable. We showed that the knee-jerk and like acts, from striking a stretched tendon, are the most refined means we possess of deciding as to the tone of a muscle; that wherever we can get such movements, as at the knee, ankle, elbow, and jaw, every distinct muscular exertion, even if as slight as winking, increases the jerk, if it be timed correctly.

Also every strong sensation on the skin, whether it be heat or cold, or hurt of any kind, at once gives increased responsive power to the muscle the tendon of which has been struck.

If we combine sudden exertion with violent sensations, like that caused by a rhigolene jet, or the faradic wire brush, the coincident knee-jerk equals that seen in spastic disorders.

What is familiarly true of the knee is also true of the elbow, where

¹ Beiträge zur Lehre von den Sehnenreflexen, von Dr. Ernst Jendrassik, Deutsches Archiv für klinische Medicin, vol. xxxiii. p. 175, 1883.

the biceps responds beautifully to a blow on its insertion tendon, and gives us an excellent test for the presence of ataxia in the upper limbs.

And now, as concerns the muscle itself, if we strike sharply with a percussion-hammer the belly of a muscle, the fibres shorten in response to the blow.

Coincident distant motions or sharp sensations at once reinforce the muscle act, and exaggerate the effects of the blow. This muscle act obeys the rules which apply to tendon-jerks.

Therefore, all forms of mechanical irritation of a muscle admit of these reinforcements. Such additions to muscular excitability disappear when the muscle is cut off from connection with the spinal centres.

Section of the nerves, or disease of portions of the cord, as in posterior sclerosis, ends all response to tendon jerks; whilst a blow on the muscle still evokes local motion in its tissue.

The explanation is not far to seek. A muscle moves when struck, because of its innate capacity to twitch when irritated, but it does not move when excited by a blow on its tendon, unless it has besides its own excitability a constant influx of tone-waves from spinal centres. These aids to motility are born of two sets of causes: 1st, the afferent impressions due to muscular metabolic changes, a constant source; and, 2d, the intermittent influx of like waves due to overflow on to its own spinal ganglia of the excess of nerve force arising from remote muscle acts or sensory impressions. Without the constant tone flood no tendon-jerks can occur, and hence this delicate response fails when the nervous arc is broken in its sensory or motor branch, or in their connecting centre, but increases with every coincident increase of tone.

The jerk from a blow on the muscle continues even after such ruptures, but both forms of response cease then to be reinforced by distant sensations or volitions.

A blow causes a muscle-jerk extending in both directions up and down, but not transversely beyond the area struck. In some cases of disease this reaction lessens or is lost, and this irregularly, not all over a muscle but in limited areas; as regards the stimulation of a blow, certain muscular regions respond better than others in health, the extensors better than the flexors, and naturally those parts near to the motor points of nerves. At the point struck, the muscle fibres may, in addition to their sudden contraction, rise somewhat slowly into a little hump or eminence which, unlike the instantaneous twitch, subsides slowly. This hump is best seen in thin and in feeble people, and in the muscles late in ataxia is sometimes unusually large and lasts longer than is common. As seen when the percussion-hammer strikes the thin and feeble chest muscles of the tubercular patient, it is familiar to most of us, but it is observable in some healthy muscles at all times. Dr. Buzzard long ago remarked, with his usual sagacity, on some of the direct muscular

reactions of nervous disorders, but although Erb and others have also given the matter attention, there are still wanting full and systematic studies of these reactions in connection with disease.

We have spoken so often of tone reinforcements, that it seems well to give some explanatory statement of what we mean by tone.

The very existence of this addition to the excitability of muscles has been doubted, but our own experiments leave us, we think, little possibility of indecision on the subject.

All over the body we find muscles which possess a variable amount of intrinsic capacity to shorten under the influence of nerve force, electricity, and mechanical excitation, as abrupt stretching or a blow.

From the spinal centres there is a more or less steady flow of nerve influence which is the final preparation for prompt muscle response to excitations.

One source is probably in the muscular chemistries. Some afferent force thus created reaches the cord by the sensory nerves of each muscle, and the current returns through the motor track and keeps the muscle ready to react. If we were to conceive of this as a sort of tuning of the muscle, a final preparation for ready reply to the will, it would perhaps be not remote from the truth.

There is another source of tone which needs no further demonstration. Remote muscle acts, or sensory stimulations also remote, at once increase the readiness of the muscle to react and numerically add to its power of motor response.

Clenching of the fist or chilling of the arm abruptly increases the knee-jerk.

This may be explained in various ways. We now hold tentatively that will-force does not confine itself to one channel in this case. Besides the needed stimulation of the hand centres, there is an overflow of gentler excitation which floods the whole spinal group of ganglia, and for the moment adds to the flow of toning influences which constantly prepare the muscle to move and increase its excitability. This is an abrupt addition to muscle tone, and hypothetically accounts for what we call reinforcements of knee- and muscle-jerks.

In childhood this overflow is competent to cause extensive movements when only one is willed, until, as we grow older, the constancy of habitual effort creates a growing tendency, on the part of nerve force, to take and keep certain very definite paths, and only a slight overflow reaches centres other than those involved in the volition.

Remnants of this difficulty are seen in our individual incapacity to move voluntarily certain muscles without unwilled action on the part of others.

Illustrations abound in disease, as Hughlings-Jackson and Buzzard have shown when certain centres become over-excitabile, and their re-

lated muscles move in irregular response to so much nerve force as overflows upon them from acts of will or from involuntary acts, meant to evoke only specific results. Here that which usually only throws on the centres mere tone waves, becomes, through their acquired excitability, competent to cause unwilled and irregular motion.

We are now in a position to understand that incessantly there are flowing variable amounts of nerve force upon and through the centres to the muscles. A blow on one of them reveals the amount of this addition to their power to respond by motion. It is well seen in the fact that a partly exhausted hand can act better on the dynamometer when its fellow is willed to consentaneous action.

A single violent act tunes, so to speak, every other muscle in the body through the overflow it sets in movement. The first blow a man strikes thus makes him more competent to strike the next, and a hurt of any kind adds directly to this readiness for action.

A beautiful illustration of overflow lies in the ease with which a torpid bladder empties itself during or just after the chilling shock of a cold bath, and helps also to explain many results of cold affusion commonly accepted as reflex.

It is probable that in certain states of enfeeblement the tone waves grow less and that in this way we may account for the difficulty of active motion which these conditions exhibit. We have ourselves observed that on dull, damp, warm days the response to knee-taps was in some men distinctly lessened, and also that reinforcements did not give us the usual ample gain in motion nor give rise to exceptionally violent responses, common at other times.

We have then tendon-jerk, its increase, its loss, and its reinforcements by distant muscle and sensation acts. We have also muscle-jerk, its increase, its loss, and reinforcements, and other peculiarities. Having acquired new knowledge as to these latter facts, we wish to apply them to disease. To do this, so as best to see relations at a glance, we have made the first extensive effort known to us to represent symptoms and their force by signs. We thus express in one table with the eloquence of condensation what we venture to call the equation of each case, and also make easy the recognition of any one symptom over a set of cases. Table I. shows the varying symptoms in twenty-three cases of locomotor ataxia, expressed in signs which may easily be interpreted by referring to the explanation at the foot of Table II.; many of these signs, however, need no elucidation. Where two signs occur in the same space, and where R (right) and L (left) are not mentioned, the first refers to the right and the second to the left side; or the first refers to the hands and the second to the feet, as may be seen by the context. Table II. is taken from Table I., and is a distinct effort to class the cases by some decisive symptom. For this we select station, the relative power to stand steady, with eyes

TABLE I.

[illegible]

TABLE II.—A PARTIAL STUDY OF TWENTY-THREE CASES OF LOCOMOTOR ATAXIA.

	CLASS I. Station normal.		CLASS II. Station slightly impaired.							CLASS III. Station greatly impaired.					CLASS IV. Paralytic stage.							
	2	11	3	6	10	12	15	16	18	1	5	7	8	9	13	14	17	19	20	21	22	23
No. of case . . .																						
Ankle- and knee-jerks . . .	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforcement . . .	R-LO	R-LO	ROL-	O	O	O	O	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Elbow-jerks . . .	N	N	N	N	N	N	N	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforcement . . .	R-LO	R-LO	ROL-	O	O	O	O	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Muscle-jerks in legs . . .	N	N	N	N	N	N	N	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforcement . . .	N	N	N	N	N	N	N	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Muscle-jerks in arms . . .	N	N	N	N	N	N	N	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforcement . . .	N	N	N	N	N	N	N	R-L+	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Chin-jerk . . .	P	P	P	O	O	O	O	N	O	O	P	P	P	P	P	P	P	P	P	P	P	P
Associated movements . . .	.....	.....	...	O	O	O	O	O	O	...	...	...	...	...	...	...	...	...	...	...	...	...
Moulding . . .	.....	.....	...	O	O	O	O	O	O	...	...	...	...	...	...	...	...	...	...	...	...	...
Prominence of eyes . . .	.....	.....	...	O	O	O	O	O	O	...	...	...	...	...	...	...	...	...	...	...	...	...
Hearing . . .	N	N	N	O	N	N	N	O	N	...	...	...	...	...	...	...	...	...	...	...	...	...
Vision (not carefully tested)	H	N	N	O	N	N	N	N	N	...	...	...	...	...	...	...	...	...	...	...	...	...
Age of patient . . .	42	37	57	47	46	44	60	52	38	49	44	56	52	52	44	40	47	51	51	58	29	52
Age of disease . . .	3	4	7	6	7	9	2½	8	4	4	7	4	?	18	5	14	5	9	10	6	22	10
Average age of disease . .	3.5 years.		6.2 years.							7.6 years.					10.8 years							

EXPLANATION OF SIGNS USED IN THE TABLES.

- M = male.
 F = female.
 N = normal.
 O = absent.
 — = slight, or diminished power or response.
 + = very slight, or greatly diminished power or response.
 ++ = marked, or increased power or response.
 +++ = very marked, or much increased power or response.
 ± = irregular, or irregular distribution.
 z = natural order of affairs reversed.
 R = incontinence.
 L = right.
 L = left.
 A = ataxic.
 S = sluggish.
 P = present.
 H = hypermetropic.
 I = small pupils.
 Δ = large pupils.

open or shut. This symptom can be made numerically accurate by standing the patient in front of a bar marked in inches, and placed on a level with the ears. The extent of lateral sway of the head may thus be easily observed; a like observation records the anterior tendency. The first is rarely over half an inch in health; the second does not usually exceed an inch, even with closed eyes. Any large increase is suspicious. The observer should be seated, in order to eliminate his own sway, and should be at a set distance from the patient. Dividing our ataxics by this test into classes we have, as a starting-point, Class 1, normal station; then Class 2, slight impairment; Class 3, great impairment; and Class 4, the paralytic stage. The division as between Classes 2 and 3 is difficult, but the check of the average duration of disease shows our classifications to have been reasonable. Now let us group the muscle phenomena in relation with the integrity and the lack of station.

We have long been looking for the tests of a preataxic stage in posterior sclerosis, which stage might be amenable to treatment; but usually the nearest approach we can make is to find pains, or strabismus, and with these, loss of knee-jerk. A glance at the double row of zeros, in the lines ankle- and knee-jerks, and reinforcement, shows that all of our cases, at least, have reached this stage, and give no information of use so far as the legs are concerned. If we turn to the arm symptoms, we are in a more fertile field. We should have reflected long ago that as ataxy of the arms comes on even years after the legs have gone through their stages of failure, we might expect, with watchfulness, to trace in the arms of recent cases preataxic alterations and the fatal progress of the arm muscles in the direction of impaired tone. But even the newest of our own cases have gone too far to yield all we wish to know or hope yet to see. We note that the arms seem to advance through the same changes as the legs. The biceps-jerk (elbow-jerk) and its reinforcement are found only in Classes 1 and 2; with a much impaired station or station loss (Classes 3 and 4) they are gone. In one case in Class 2, the elbow-jerk, though absent, is seen on reinforcement. Had we a much larger number of cases we should probably observe more instances of lost elbow-jerk with reinforcement yet possible, in various degrees.

In one instance the elbow-jerk and reinforcement are in excess, and this, with some like facts, makes us query as to the possibility of their being a representation of a preataxic stage of excitability. Several cases recently studied by us present some of the earlier symptoms of posterior sclerosis, and yet show an increase of the knee-jerk with an increased reinforcement. May not this represent an irritative condition of the cord which will subsequently fade and give place to more decisive and distinctive local trouble in the posterior columns?

Bramwell¹ believes that an exaggeration of the reflexes may result from increased excitability of the gray matter. In such cases it is but too likely that a diagnosis of disease of the lateral columns would be accepted as the sole explanation.

The very interesting investigations of Norris² tend to corroborate this view of the case. He discovered an increase of the knee-jerk in eighteen out of thirty-seven cases, which also exhibited varying degrees of degeneration of the optic nerves and were, presumably, early ataxias. Later examination showed, in some of these, a diminution or absence of the knee-jerk.

In Classes 3 and 4 the elbow-jerk is lost, just as the knee-jerk was long before. The forearm muscle-jerks and their reinforcement are interesting—both normal in Class 1. As the cases advance, the muscle-jerks show irregularities, and are not lost utterly in a single case, up to the paralytic stage, while reinforcement of them is not possible in some of Class 2, and in Classes 3 and 4 is absent.

TABLE III.—A STUDY OF THE MECHANICAL REACTIONS OF TENDON- AND MUSCLE-JERKS IN LOCOMOTOR ATAXIA.

	1st stage.	2d stage.	3d stage.	4th stage.	5th stage.	6th stage.
Tendon-jerk . . .	Diminished or absent.	Absent	Absent	Absent	Absent	Absent
Reinforcement . . .	Fair	Absent	Absent	Absent	Absent	Absent
Muscle-jerk . . .	Normal	Normal	Normal	Increased, regularly or irregularly distributed.	Diminished and irregularly distributed.	Absent
Reinforcement . . .	Normal	Normal	Absent	Absent	Absent	Absent

NOTE.—A pronounced tendon-jerk capable of excessive reinforcement is sometimes seen in the earliest stages of locomotor ataxia. Moulding of the muscle at the point struck sometimes occurs in stages 4 and 5, and occasionally even in 3.

From these data Table III. is made up. It represents the mechanical reaction changes in the muscle- and tendon-jerks of the arms, and theoretically in those of the legs. They may be seen to alter in this order. The tendon-jerk is lessened or lost, but can still be reinforced in the first stage. In all successive stages both are absent. Meanwhile the muscle-jerk, say of the extensors of the hand, is healthy in stages 1 and 2, and reinforcible in both. In stage 3 the muscle-jerk is normal, but there is no reinforcement. In stage 4, with station much impaired, the muscle-jerk becomes increased. It is quicker and larger, as Buzzard observed in 1878, and Erb also, but now it is irregularly distributed, and may be less in places, and cannot be reinforced. In stage 5 the muscle-jerk

¹ Diseases of the Spinal Cord, by Byrom Bramwell, M.D., F.R.C.P. Edinburgh, 1882, p. 112.

² On "The Association of Gray Degeneration of the Optic Nerves with Abnormal Patellar-tendon Reflexes," by Wm. F. Norris, M.D., 1885. Transactions of the American Ophthalmological Society.

is lessened irregularly, and no reinforcement is possible. In stage 6, that of complete paralysis, rarely attained because death is apt to intervene, all the reactions, tendinous and muscular, and all reinforcements vanish. Of the chin-jerk, little can be said. It is sometimes absent in health, or is hard to get, and seems more common in stages 1 and 2 than in 3 and 4.

The various changes here mentioned probably represent incompletely, the totality of alterations of muscles in posterior sclerosis. The gradual cutting off of spinal tone waves is shown in the successive loss of tendon-jerk and its reinforcement, and of muscle reinforcement. The increase of direct muscle-jerk which ensues may be due to some irritative changes in the muscle, not as yet to be fully understood. It is followed by lessening of muscle-jerk, and at last by paralytic loss of all muscle reactions. Some microscopic studies of muscle tissues are still needed to explain these late phenomena.

While studying the effects of voluntary motion on the tendon- and muscle-jerks it was noticed that associated movements occurred in many of the cases. Thus, on clenching the fist, movements occurred in the other hand, or even in one or other of the legs. This we discovered too late to note it in all our cases. It apparently belongs to an advanced condition of the disease. To observe it, the hand should rest in passive supination on the thigh, while the opposite fist is being clenched; the patient's attention should not be called to the possible result of the experiment.

In Class 4 it was seen in six out of seven cases, and not looked for in one. In Class 3 it was present in three out of the six cases, absent in one, and not looked for in two.

In Classes 1 and 2 it was seen twice, absent five times, not sought for in two patients—a percentage of 64.75, exclusive of five cases where the symptom was not looked for. Muscle-mounding was found irregularly, without positive relation to the state of the disease.

A new symptom, distinct prominence of the eyes, with a full appearance of the surrounding tissues not due to œdema, was found six times, chiefly in late cases. Hearing was lessened in 44.4 per cent. of the cases in Classes 1 and 2; in 66.6 per cent. in Classes 2 and 3; and was normal in but one of Class 4. Vision was not tested with care.

INSANITY AND CRIME.

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UNDER this heading, an article from the pen of Lord Bramwell appeared in the December number of *The Nineteenth Century*.

Any utterance of so distinguished a judge, such an eminent legal authority, demands careful consideration and respectful attention.

The authority of his name, and the dogmatic form of his propositions, give such weight to what he writes that many will accept his statements as conclusive.

However presumptuous it may appear, it is this fact which makes it all the more incumbent on a member of the medical profession to record a protest against the doctrines enunciated and the conclusions arrived at by his lordship.

I concur with him in deprecating a quarrel between doctors and lawyers. Lawyers are bound to administer the law as it exists, whether it be good or bad; but doctors have a right—a right common to all citizens—to protest against, and endeavor to have amended, a law which they believe to be both unjust and cruel, and which they know fails to carry out the object it has in view.

The law as laid down by him is evidently taken from the answers of the fifteen judges to the House of Lords; it is restricted by him to its very narrowest interpretation—the knowledge of right and wrong.

It is fair to interpret Lord Bramwell by Lord Bramwell—so as clearly to understand what he means by “that he did not know that the thing he did was wrong.” In the case of Thomas Humphreys, tried before him at Stafford, he defined doing wrong as “what the law forbade,” ignorance of the nature and quality of the act, as “did not know he was inflicting hurt,” or “that his act was injurious to the person he attacked.”

The law so limited he thinks right to demonstration. Sir James Stephen, an authority of at least equal weight, differs from him. He considers that the answers of the judges

“leave untouched the most difficult questions connected with the subject, and lay down propositions liable to be misunderstood, though they might, and I think ought to be construed in a way which would dispose satisfactorily of all cases whatever.”

He considers that the points on which the law appears to be left in doubt may be reduced to one question:

“Is madness to be regarded solely as a case of innocent ignorance or mistake” (Lord Bramwell’s view), “or is it also to be regarded as a disease which may affect the emotions and the will in such a manner that the sufferer ought not to be punished for the acts which it causes him to do?”

“I am of opinion that even if the answers given by the judges in Mac-

Naughten's case are regarded as binding declarations of the law of England, that law as it stands is, that a man who by reason of mental disease is prevented from controlling his own conduct is not responsible for what he does."

Again,

"If the narrower interpretation of the answers given by the judges is the true one, and if these answers are regarded as a complete and binding authority, madness must be regarded as merely a possible cause of innocent mistakes as to matter of fact and matters of common knowledge."¹

An American judge thus speaks of the doctrine as to insanity contained in the answers of the judges:

"The doctrine thus promulgated as law has found its way into text-books, and has doubtless been largely received as the enunciation of a sound legal principle since that day. Yet it is probable that no ingenuous student of the law ever read it for the first time without being shocked by its exquisite inhumanity."

"It practically holds a man, confessed to be insane, accountable for the exercise of the same reason, judgment, and controlling mental power, that is required in perfect mental health. It is in effect saying to the jury, the prisoner was mad when he committed the act, but he did not use sufficient reason in his madness. He killed a man because under an insane delusion he falsely believed the man had done him a great wrong, which was giving rein to a motive of revenge, and the act is murder. If he had killed a man only because under an insane delusion he falsely believed the man would kill him if he did not do so, that would be giving rein to an instinct of self-preservation, and would not be crime."

"It is true in words the judges attempt to guard against a consequence so shocking as that a man may be punished for an act which is purely the offspring and product of insanity, by introducing the qualifying phrase 'and is not in other respects insane.' That is, if insanity produces the false belief which is the prime cause of the act, but goes no further, then the accused is to be judged according to the character of the motives which are presumed to spring up out of that part of the mind which has not been reached or affected by the delusion or the disease."

"To say that an act which grows solely out of an insane belief that some great wrong has been inflicted, is at the same time produced by a spirit of revenge springing from some portion or corner of the mind that has not been reached by the disease, is laying down a pathological and psychological fact which no human intelligence can ever know to be true, and which if it were true, would not be law, but pure matter of fact."²

Lord Bramwell states the law is right to demonstration for the reasons he has given. The reasons he has given are:

"The law ought to punish all whom it threatens on conviction."

"It ought to threaten all who would be influenced by the threat, all whom it would or might deter or help to deter."

"Therefore the question should be, not whether a person accused of crime is mad, but did he understand the threat; if he did not, the threat would be unintelligible to him, and would not deter."

This assumes that if an insane person understands that the law punishes a certain act, he will be deterred from doing it, or influenced by the threat; and to this assumption a unanimous denial is given by all those who have studied insanity, and have experience of the insane.

¹ Stephen, *History of Criminal Law*, vol. ii. 1883

² Ladd, *State v. Jones*.

His propositions seem also to imply that the one object of the criminal law is to deter, from fear of punishment alone, people from doing certain acts.

From this view Sir J. Stephen dissents,

"being of opinion that if in all cases criminal law were regarded only as a direct appeal to the fears of persons likely to commit crimes, it would be deprived of a large part of its efficiency."

He does "not think it admits of a doubt that law and morals powerfully support and greatly intensify each other in this matter;" and that "whatever effect the administration of criminal justice has in preventing the commission of crimes is due as much to this circumstance as to any definite fear entertained by the offenders of undergoing specific punishment."¹

To the fear of punishment must, therefore, be added the infamy which attaches to a criminal conviction, and this is entirely incomprehensible to a multitude of the insane who are perfectly capable of understanding that a given action is forbidden by the law.

But surely the object of punishment is more than to carry out a threat, or to deter certain persons from specific acts. While on the one hand, it seeks to protect society by preventing crime through fear of infamy, on the other, it strives to effect its purpose by incapacitating the criminal, so that when he is incarcerated it endeavors to reform him.

An insane person is, no doubt, prevented from committing criminal acts by being executed or imprisoned; but is he likely to be reformed by imprisonment—that is, cured? Most certainly not, quite the contrary; on this point I can speak with the authority of my experience as a prison surgeon. So one object of punishment does not apply to him as it does to the sane.

To make Lord Bramwell's propositions logical, they ought to be expressed somewhat as follows:

The law ought to punish all whom it threatens on conviction.

It ought to threaten all who would be influenced by the threat, all whom it would or might deter or help to deter.

All madmen who understand the law's threat are influenced by the threat—are or might be deterred or helped to be deterred by it.

Therefore, all madmen who understand the law's threat ought to be punished.

Now I deny that all madmen who understand the threat are influenced, etc., or deterred by it.

Lord Bramwell admits this, for he says it does not always deter; therefore, from his own propositions, it would follow that some madmen who do understand the law's threats ought not to be punished.

To escape from this dilemma, he argues that the same is true of men in their perfect senses, and, if that were a reason for not punishing the insane, it would equally be a reason for not punishing the sane. This I

¹ Stephen, *op. cit.*

deny. In the first place, no comparison lies between the sane and the insane; and, in the second, there is an incorrect assumption.

It is assumed that the threat of punishment is equally effective in deterring the insane and the sane. This is contrary to fact. While it may be true to say that it would be inaccurate to assert that it *never* deters, it is perfectly correct to say it *seldom* deters, and then only in those cases in which the mental disease is so slight that not only is there intellect enough to comprehend, not as an abstract idea, but as a real practical fact, both the law's threat and the infamy attaching to crime, but also sufficient will or self-control left to govern action.

If the threat of punishment does not deter the insane, and I say it does not or cannot in anything like the same proportion that it does the sane, then the entire structure, built on those whom the law ought to punish, and those whom it ought to threaten, falls to the ground.

Admitting that it does not always deter, Lord Bramwell gives as a reason that "it does not deter as often as it ought because madmen are cunning enough to know that from the way the law is administered (owing to the unwise mercy of judges and juries) they can commit crimes with less chance of imprisonment than sane people can." To any one who has studied insanity, who has experience of lunatics, this statement appears so astounding, so entirely contrary to fact, that it is difficult to believe that it is seriously put forward. With rare exceptions, madmen do not know they are insane. They are indignant, and feel outraged if their perfect sanity is questioned, and will endeavor, to their utmost, to prove they are sane.

To the insane man, his delusions are a reality, he has no doubt of their existence, all the argument and proof which could be put before him will not convince him to the contrary; the voices he hears are real voices, the figures he sees are real figures, the torments he suffers are real torments; his ideas are the only correct ones, if they differ from those of other people so much the worse for the others, he is actually the person, or divinity, or demon he believes himself to be, of that he has no doubt. He may have wit enough and strength enough to conceal his delusion when it suits his purpose, and to prove that he is sane; but he never puts it forward, or admits it is a delusion to prove his insanity—one of the most marked features distinguishing real from feigned insanity is that whereas the lunatic believes that he is, and tries to prove himself sane, the malingerer endeavors to prove that he is mad.

In a lucid interval a lunatic may remember what he did and deeply deplore his act; nay, more, he may admit that he was mad when he did it; but that does not show that, when mad, he knew he was so. He may also recognize the symptoms of an approaching paroxysm, and beg to be taken care of.

An insane person in an asylum may know that a madman has a chance

of escaping the legal consequences of a criminal act. Thus, when Martin set fire to York Minster, the inmates of an asylum discussed the probabilities of punishment, and one of them exclaimed, "They cannot hang him, because he is mad; he is one of ourselves."

It is important, however, to understand that this consciousness of their state belongs only to madmen surrounded by madmen in lunatic asylums, or to those who have been under treatment, and that even to those so circumstanced it is not general.

It is no proof to the contrary that in asylums the inmates are, to *some extent*, deterred from doing wrong, or stimulated to do right, or rather to exercise some self-control, from the fear of losing some indulgence, or of closer restraint. These motives can be only acted on very cautiously, for, if overstrained, the patient is injured, and all control over him is lost.

But the power which can control is, in an asylum, brought clearly and comprehensively home to him. It is tangibly present in the forms of the attendants; it is so simple, so immediate, so visible, that he can grasp the fact, not of punishment perhaps, but of a power which, rightly or wrongly, justly or unjustly, can and will prevent unruly action.

Outside the asylum he sees no such power. He may have an abstract notion of the law's punishment; but it is a vague, unreal knowledge, that has no practical or controlling effect on his thoughts and actions.

If the argument had been: If we admit that the law's threats do not deter the insane, and therefore they should not be punished, sane criminals will feign insanity so as to escape the consequences of their acts, it would have been correct; but that would be no reason to punish madmen.

Admitting they have not the same control over their actions that sane people have, Lord Bramwell denies that they cannot help their actions, and says they are restrained and kept in order in the same way sane people are, though with more difficulty.

If he means when at large in the world, I absolutely deny it; it is absolutely contrary to the experience of all who have a knowledge of the insane. It presumes that a madman reasons like a sane one, and that, judging how a sane man will act, will enable us to predict how an insane man will act if we knew his delusions or thoughts. Locke's aphorism that a madman reasons aright from wrong premises is far from being universally true.

If he means when in asylums, then it is only partially true. That lunatics in confinement are kept in order with infinitely more difficulty than sane prisoners, is true; but that they are or could be by the same discipline and methods, is not correct. If we know what a sane prisoner thinks, we can pretty accurately tell what he will do; but it is totally different with the insane. Knowing what they think, or knowing their

delusions, will not tell us what they will do, or what will be the outcome of the delusion in action. Sir J. Stephen defines compulsion (mental) as choosing the less of two evils. A madman, driven to commit homicide by a delusion that he was obeying a divine command, which, if he disobeyed, would consign him to eternal torment, could not control his action, although he might be well aware, not only of the legal penalty, but have an intense horror of the act, and deeply deplore the terrible necessity which compelled him to do it.

That in some cases insane persons do resist a criminal impulse is no proof that all can—moreover, experience shows that the power of resistance in such cases is often lost after a time, in others, it is evidence of recovering sanity; but in a given case to decide whether an act was controllable or uncontrollable—that is, how much was due to sanity and how much to insanity—is to tax human intellect beyond what it is able to bear.

Having admitted that from their unhappy mental state the insane have less control over their actions than the sane, Lord Bramwell allows that the argument used by him goes the length of severer punishment for insane people—that is, it presumes that it is a case of unwillingness not of inability to control their actions; indeed, this is made clear by the illustration given.

In fact, he makes madness to mean badness. If a man, from mental disease, has not the same control over his actions as a sane man, I fail to see how the law, by threatening to punish him, can place him on the same level with the sane.

It is not a case of will not but cannot, of physical disability, of loss of power—no amount of punishment can make a man with a paralyzed arm use it, or stop the facial contortions or muscular jerkings of chorea, or the convulsions of epilepsy,—and no amount of punishment or magnitude of threat can restore to the insane the control over their actions of which they have been deprived by their unhappy mental state. This is a matter of fact and not of law—no law can make or cure a disease, nor can any law create or restore a power removed, perverted, or weakened by disease.

The law, as defined by Lord Bramwell, is, I say, illogical, cruel, and unjust—it is repulsive to common sense, it is out of harmony with the moral sense; and hence, juries, in opposition to the direction of judges, return verdicts of not guilty on the grounds of insanity.

It exempts from punishment those insane people alone who do not know they are doing wrong—that is what the law forbids.

Now a delusion that some one is about to kill him is no stronger evidence of disease, than a delusion that some one is about to injure him, or than any other delusion, nor in the one case does the insane man think, or is he more capable of thinking, whether his action is legal or illegal.

Both are equally mad, equally incapable of calm thought, or of judgment as to right and wrong.

A delusion being a symptom of a disease it is irrational to exempt from punishment the case in which the connection between the symptom and the action is apparent, and to include the one in which it is not. The disease is the same, the effect on the mind identical. Moreover, the action may be the direct consequence of the delusion, although the sane mind is unable to follow the process of thought which led up to it; "there is an incoherence between their ideas, and there is an incoherence between their ideas and actions."

The example given in the article illustrates this, "Stealing, with proof that the offender believes he is the King of England. He goes to a shop, has goods shown him and secretes some, or picks a pocket; he has a delusion unconnected with his crime." But is the delusion unconnected with his crime? With the insane delusion of grandeur would probably be the insane enlargement of the prerogative, the right to take a subject's property—he has learned from experience that his title is not acknowledged generally, and concludes that the shopkeeper will not admit it either, and will prevent his taking what he wants—therefore, he secretes it—or he knows that subjects have often rebelled against the exercise of the prerogative when it affected their property or purses—but, at the same time, he is perfectly satisfied he is acting within his legitimate rights.

Delusions do not destroy but pervert the mental faculties, and it is impossible to say, although a delusion is apparently unconnected with a crime, that it has not been a compelling cause of its commission.

Thus in the case of the madman, quoted by Lord Bramwell, who had a craze about windmills, and who, on being removed to a part of the country where there was none, first set fire to the house in which he was placed, and on another occasion enticed a child into a wood, and, in attempting to murder it, cut and mangled its limbs in a horrible manner, there was no apparent connection between his craze about windmills and either or both the crimes, yet it was the direct cause, for he perpetrated them in order that, as a punishment, he might be sent to some place where he could spend all his time watching windmills. For this man Lord Bramwell has no pity, and thinks him as hateful as any sane criminal could be. Yet Sir J. Stephen thinks "it would be open to a jury to draw the conclusion that he was incapacitated from forming a calm estimate of the moral character of his act—in other words, he had not the capacity of knowing that it was wrong."¹

Another example given is that of a man who, from some religious craze, wanted to be executed, and who, to bring it about, committed murder. This, Lord Bramwell considers a case of utter selfishness and

¹ Stephen, *op. cit.*

cruelty; and neither his conscience nor his pity would be moved in favor of the wretched creature—that is, he says the man was bad, but not mad. But it is difficult to conceive a sane man committing murder with a view of being hanged; and, taking merely the deterrent view of the law's punishment, it evidently could have no effect on such a one. Therefore "it would be wrong to punish him, because it would be useless to threaten him."¹

To the argument that the law is hard or unjust to the insane, it is no answer to say it might be used by others than the lunatic. Whether the law is hard or unjust to others, is beside the question. If others are oppressed by it (I do not say they are), that is no reason why the lunatic should be; doubling the evil will not lessen it. Where the offender is insane, his act is the product of disease, or so mixed up with it that it is impossible to say how much is caused by disease, and how much is not.

This case is so like Hadfield's that the words of Sir J. Stephen with reference to it apply aptly:

"The propositions that the effect of disease upon the emotions and will can never, under any circumstances, affect the criminality of the acts of persons so afflicted, is so surprising, and would, if strictly enforced, have such monstrous consequences, that something more than an implied assertion of it seems necessary before it is admitted to be part of the law of England."²

In dealing with what are called monomanias, Lord Bramwell has been neither successful nor scientific. He asserts that a great number of madnesses have been invented in modern times; defines a monomaniac as "the man being sane, except having a strong passion for drink and so on;" declares such persons are not suffering from disease of the mind at all; only wrong in their passions, appetites, or propensities. He bases his belief on a dictionary definition of mania, and argues, therefore, that kleptomania cannot exist, because it is consistent with the greatest calmness and cunning; homicidal mania, because the steps can be taken with no appearance of delirium or want of calmness; dipsomania, because men afflicted with it have had mental capacity of the highest order—all of which shows a startling ignorance of the subject he is writing on.

I am not aware that Lord Bramwell has studied physiology and pathology; that he has ever spent any portion of his time in an asylum, watching the habits of the insane, studying their method of thought, unravelling the tangled maze of their ideas, and from day to day observing and recording facts and cases. If he had, then, indeed, his opinions as to what is or what is not madness would be valuable, and probably correct.

The law, indeed, declares that partial insanity exists, the man being

¹ Lord Bramwell, *Nineteenth Century*.

² Stephen, *op. cit.*

sane in other respects. To question 1 of the House of Lords, the judges reply: "Assuming that your lordships' inquiries are confined to those persons who labor under such partial delusion only, and are not in other respects insane."

But such madness does not and never did exist. The mistake has arisen from magnifying a symptom into a disease. The disease is madness, or unsoundness of mind. But a delusion or idea may dominate the mind, may be the principal, and to the superficial observer the only symptom, and because its effect and control over the rest of the mind are not apparent, the man is said to be sane in other respects. Whether he is so or not is a matter of fact; if he is not, then the law cannot make him so, and those whose special study and life-long observation of the insane give them the right to speak authoritatively declare in no uncertain terms that he is not.

"The difficulty which exists has arisen from the occasional treatment by experts of these floating symptoms of one disease as if they were independent diseases. There is but one mind to each of us, though the mind has many functions. There can be but one disease to which psychologically the term insanity may be applied, though this disease manifests itself even in one and the same patient in various ways."

"The mind of man is not like a ship constructed with water-tight compartments, one or more of which may be injured or waterlogged, leaving the rest sound and unaffected. If one of the so-called mental faculties is affected, all suffer with it, all are more or less influenced or controlled by it."¹

Monomania is merely a subdivision (for convenience of study or description) of madness.

The existence of the various so-called monomanias are facts proved to demonstration. That with madness of the more dangerous type there often exist great intellectual power, absence of delirium, and perfect calmness, is also a fact proved to demonstration—a delusion which dominates the entire mind may be so skilfully concealed that it escapes observation for a long time; as, for example, the well-known case in which Erskin totally failed to elicit from a lunatic the slightest indication of his insanity, until after a long course of cross-examination he was told by some one in court what the delusion was; or that of the man in the Bicêtre, who baffled the commissioners sent to examine him, and only betrayed his delusion by signing his discharge as Jesus Christ. It is impossible for the sane mind to follow the workings of the insane, for action which apparently has no connection with the delusion may be its insanely logical conclusion. Madness does not in all cases destroy the mind—it perverts it. Thus the madman with the delusion that God has commanded him to kill himself or some other person, will go about what he believes to be his duty with calmness and determination, without apparent delirium or excitement, will show reason, judgment, fore-

¹ Francis Wharton, Wharton and Stillé, 1882

sight, and self-control, while all the time he is compelled by insanity to take his own mother's life.

What are passions, appetites, and propensities? Where do they exist? Why there is not one of them which may not be, and often is, excited to ungovernable activity, or altogether abolished by disease of the brain.

Metaphysical distinctions, drawn from the inner consciousness of sane men, are not in harmony with either the pathology of insanity or the physiology of the brain.

The moral faculty is something apart from, and as it were outside of the intellect, according to metaphysicians. Yet it is not so. Knowledge of right and wrong is as much an intellectual acquirement as a knowledge of the rivers and mountains of Europe, or the problems of Euclid.

What is called moral insanity is nothing more than disease or defective development, exhibiting itself in either incapacity or disturbance of the knowledge, or power to control the actions which are considered morally right or wrong.

There is not sufficient information given to say whether the man mentioned was sane or insane; but on hearing that a married man, of excellent character, committed thirty or forty crimes of the nature indicated with the greatest violence and cruelty, I should, were I examining him, look not only for hereditary taint, but for symptoms of that most insidious and fatal disease—general paralysis of the insane.

It is a well-known fact that insanity and general paralysis of the insane often seem to commence with immoral acts. The man of hitherto blameless life, of religious principles, or of unimpeachable integrity, of unstained moral character, becomes a thief, a liar, a drunkard, or gross sensualist. The inequality of the pupils, the slight tremulousness about the mouth, the hesitation in speaking, the tremor of the tongue, other *little* symptoms, are not noticed, or ignored. The man's fall from virtue is deplored, and the idea that his changed conduct is the outcome of fell disease is treated with contempt.

What should be done with such persons, Lord Bramwell asks. He is not averse to hanging, only doubts whether flogging would not be better—more deterrent. Unfortunately for him, it has been tried and found a failure. Madmen have been flogged, put in the pillory, enclosed in cages, chained like wild beasts, yet, strange to say, it did not prevent other men becoming insane, nor insane men from committing crimes. All punishments that have been tried have proved failures, and must always fail.

As the law cannot create or limit a disease, so must its threats and punishments prove ineffectual either to abolish a disease or to control the actions resulting from it.

What is to be done then with madmen? Are they to be left at large to the danger and detriment of society? Certainly not. Send them to

their proper place—an asylum. If an insane man commits homicide, by all means confine him in an asylum for life; the protection of society demands this, not only to guard against a repetition of the act by the lunatic himself, but to prevent simulation of insanity by the sane. Imprisonment for life with lunatics would be to the sane far greater punishment than penal servitude—to many, worse even than death.

For less offences, confinement in an asylum till cured.

To punish a man for having a disease, or for the acts which his disease compels him to do, is unjust.

“Whatever the law may declare, I suppose it will not be doubted that a man whose power of controlling his conduct is destroyed by disease would not be regarded as morally blameable for his acts. If a man is punished by law for an act for which he is not blamed by morals, law is to that extent put out of harmony with morals, and legal punishment would not in such a case, as it always should, connote as far as may be possible, moral infamy.”¹

To remove a madman to a place where his disease will be properly treated, and where he cannot injure others, is just, politic, and humane.

Penal discipline is injurious to the insane; lunatics cannot be kept in prison; not only because it is detrimental to them, but because their presence is subversive of discipline, and a constant danger to the other prisoners and to the officers.

Whether a man is mad or not can be decided only by those who have experience of insanity—that is, by experts. If a man walked lame, Lord Bramwell could not help thinking him lame, although a Paget said he was not. Paget could tell whether he was really lame or shamming, Lord Bramwell could not.

In the case of a distinct, well-marked madness, lawyers and laymen can tell that the man appears mad. Whether he is so or not, or only shamming, can be decided only by those skilled in the habits and treatment of the insane—that is, by experts.

Madness is a disease far more subtle in its symptoms than other diseases, yet experts decide as to other diseases: why not as to madness? Yet by law they have to decide as to madness too, for an insane person cannot be taken into an asylum unless certified by medical men to be mad.

The law as it stands is a wrong law; it tries to define what is indefinable; to create a disease which does not exist; it withdraws from the jury matter of fact, and establishes tests which experience has shown to be utterly fallacious.

Finally, Lord Bramwell thinks it hard to say why lawyers generally supposed sharp enough should go wrong on this particular subject. The answer is simple: their education and training have not fitted them to deal with it. Versed in metaphysical lore and legal subtleties, they

¹ Stephen, *op. cit.*

have not studied physiology or pathology, nor acquired experience of the insane; just as no amount of book learning alone will enable a physician to deal with sickness, or a surgeon to operate, so no mere mental philosophy or legal training will enable a lawyer to grapple with the paradoxes of insanity. If lawyers were obliged to spend six months in an asylum studying mental diseases, they too would be quite as anxious as doctors are that the law should be changed, and would be just as convinced that it is wrong, as Lord Bramwell is that it is right. Nor would they fall into the error of considering madness not a disease of the body; for whether we look upon mind as the product of the brain or merely working through it, it is disease, functional or organic, of the organ, which is either its origin or instrument, that constitutes madness.

REFLEX AURAL SYMPTOMS WITHOUT AURAL DISEASE.
AURAL DISEASE EXCITING REFLEX SYMPTOMS.

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In the *Annales des Maladies de l'Oreille du Larynx et des Organes Connexes*, September, 1884, an article appeared, entitled "Aural Symptoms occurring in Hysteria, and the Hysterical Element in Aural Disease." Two cases were reported: one of aural symptoms simulating inflammation of the mastoid, and caused by hysteria; the other, where slight hysterical symptoms were much increased by inflammation of the middle ear, with serous effusion. The report of these cases, which opens a wide field of research in the domain of hysteria, directs attention to another group of cases, occurring mostly in children, and which apparently is to be classed under the head of aural symptoms arising reflexly from trouble in other parts of the economy, and conversely reflex symptoms of other organs caused by aural disease.

This subject has, as yet, been very imperfectly recorded in the literature of pediatrics, and yet is of considerable importance in the symptomatology, prognosis, and treatment of children's diseases; and in order that our meaning may be thoroughly understood by our readers, we will, before discussing the subject in detail and reporting our cases, present briefly the following examples, illustrating the two branches of the subject:

CASE I. *Reflex aural symptoms; no aural disease.*—A. D., aged fourteen months, has eight incisor teeth, and from general appearances is probably in the process of cutting the first four molars; frequently suffers from pain in both ears, partial temporary relief to the pain being obtained by inflation of the Eustachian tubes; careful examination of the ears reveals nothing abnormal beyond, at times, an evanescent injection of the membrana tympani.

The pain gradually grew less severe, and the attacks less frequent, but the trouble continued until the molars were well up under the gums.

Diagnosis. Irritation of dental nerves in bone sockets; reflex irritation and suspense of vasomotor inhibition through the otic ganglion, causing dilatation of tympanic vessels, pressure, and aural pain.

CASE II. *Aural disease; reflex pulmonary symptoms.*—B. C., three and a half years old, has for some months had purulent inflammation of left middle ear; sometimes a discharge being present, and again ceasing for several weeks; but perforation of the membrana tympani always remaining unclosed.

December 24. For some days has been having an offensive purulent discharge from the ear, with a temperature varying from 99° to 101° F.; was out of doors in the morning and exposed to a cold easterly wind; did not seem well in the middle of the day; loss of appetite, chilly sensations and pains in limbs; throat slightly reddened; in the night, symptoms grew worse; the temperature went up to 105°, the pulse to 160, and the respirations to 75; nothing abnormal was found in the lung or larynx, and yet the quickened respirations were of a pulmonary type; examination of the ears showed nothing to account for the severity of the symptoms but the same purulent offensive discharge; temporary relief to the respirations and a reduction of temperature were obtained by inflating the Eustachian tubes and syringing the ear; the symptoms, however, returned on the following day, and when seen by another physician in consultation (respirations 75; temperature 104°; pulse 160) were pronounced to be those of pneumonia, until repeated and careful physical examination proved that the respiratory tract was not involved, and inflation and syringing were followed in a few hours by reduction of the respiration to 25, and the temperature to 98.2°; no further trouble arose in the case.

Diagnosis. Purulent inflammation of middle ear; reflex symptoms simulating pneumonia.

The intimate association of the filaments of the pneumogastric nerve with the ganglia of the sympathetic system, will suffice for the present as an explanation of the marked pulmonary symptoms existing in this case, where the source of the disease was evidently aural; we shall, however, later refer again to these pulmonary symptoms in a case somewhat more complicated than the one just cited; our first example also will be more clearly explained when we come to speak of the connection between the teeth and the ears.

One point especially to be urged in these cases of aural lesion of reflex origin is that the preliminary congestion occurs, in the great majority, in the upper portion of the tympanic cavity, and upper portion of the membrana tympani. The more immediate source of the blood supply of

this region is a tympanic branch of the carotid, sometimes two or three branches, passing through openings in that portion of the bony wall of the carotid canal which forms a part of the anterior inferior wall of the tympanic cavity.

These branches are necessarily short, of considerable size as compared with other sources of blood supply, proceed directly to their point of distribution, and have not, according to Politzer, the usual capillary terminations; these facts, taken in connection with the force of their circulation derived so directly from the carotid, make them especially liable to sudden and extreme dilatation on the suspense of vasomotor inhibition, and that the nervi-vasorum constituting the carotid plexus at this part of its course come largely from the otic ganglion (Woakes), and are hence placed in direct communication with distant parts, is the second of the important factors which explain the sudden and often unexpected implication of the middle ear in the diseases of other organs.

The sympathetic nerves of the lining membrane of the middle ear spring from the sympathetic plexus which accompanies the carotid artery in its canal. By means of orifices in the canal, several small branches of this plexus enter the tympanic cavity as nervi-carotico-tympanales, to form in its anterior portion together with the ramifications of Jacobson's nerve, and the nervus petrosus superficialis minor, the plexus tympanicus. From this proceed the finer nerves for the whole lining membrane of the middle ear.

The important influence exerted by the sympathetic nerves upon the vessels of the tympanic cavity is shown by Prussak's experiments on dogs.¹ The tympanum was opened, and while the portion of the sympathetic in the neck was galvanized, the vessels of the promontory and of the membrana tympani were examined by a magnifying glass. Shortly after the beginning of the irritation, the vessels became smaller, diminishing so as to be almost invisible; when the irritation ceased a considerable expansion of the vessels took place.²

We shall confine ourselves, for the sake of brevity, to cases implicating the middle ear, leaving out of consideration that large group of symptoms connected with disease of the internal ear which has already been investigated, and also not attempting to cover the whole ground of reflex middle ear affections, merely citing such illustrative cases as have happened in our practice.

A few words regarding the general mechanism of the phenomena represented in these cases, and so admirably spoken of by Woakes in his article on "Sources of Ear Affections in Infancy and Childhood," may be of aid in fully appreciating the otherwise inextricable complex of

¹ Prussak. Ueber Anastomosen zwischen den Gefässbezirken des Mittelohrs und des Labyrinths. Archiv f. Ohrenheilkunde, xi.

² Politzer. Diseases of the Ear. English edition, p. 50.

symptoms which we are about to describe, and we can then take up the especial anatomical connections which serve to elucidate the individual case. Woakes says, "The anatomical mechanism, to the consideration of which these remarks lead, will be found in that portion of the nervous system constituted by the ganglia of the sympathetic chain and its afferent and efferent branches."

By far the most important fact in connection with the sympathetic system is that, with one or two exceptions, all sensori-motor nerves include fibres belonging to it. These sympathetic fibrillæ proceed to their companion cerebral or spinal nerve from that ganglion which is nearest to the latter when it issues from the spinal canal, or that join it from ganglia near which it passes in its course.

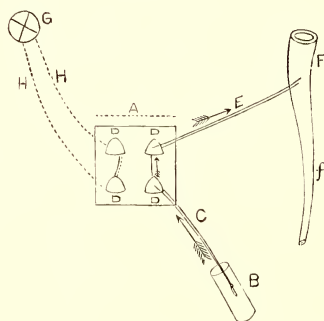
These sympathetic fibres are afferent in their function as regards the ganglion—*i. e.*, they convey impressions from the tissues to which they are distributed to the ganglion, or, beyond it, to centres within the spinal cord. They may be looked on as taking this ganglion in their course to the general vasomotor centre, hypothetically seated in the medulla oblongata, but it must not be forgotten that when these fibres thus enter a ganglion, they communicate with its caudate cells. This important fact brings them into communication with another set of nerves coming from very different directions to the same ganglion.

The second set of fibrillæ referred to as entering the ganglion, proceed by a similar course from the general centre, to join a given sympathetic ganglion; they then, similarly to the afferent sympathetic fibrillæ, mingle with the caudate cells of the ganglion, after which they quit it to seek their several destinations on the coats of the arteries. They are efferent or centrifugal in their function, conveying impressions from the general centre or the sub-centre constituted by their ganglion, to the arteries whose calibre it is their function to regulate; hence they are usually called vasomotor nerves. It will probably be found a not incorrect inference to regard these centres, whether primary or secondary, as playing a subservient part to the tissues which animate them. From this point of view, they will be reduced to the level of stations for receiving and transmitting impressions originating in the vital work of the areas with which they communicate, and, therefore, devoid of any power of originating such impressions, though they do undoubtedly modify the impulses passing through them, according as their vigor or vital energy is less or more than normal. We may conclude then that the sympathetic ganglia not only play the part of secondary centres or sub-centres, receiving and transmitting impressions quite independently of the general centre, but that they are also correlating organs, by means of which afferent tissue impressions from one direction are reflexly referred to a totally different tract, where they find expression as modifications of vessel calibre in that tract, the afferent impressions being

manifested through their medium as efferent impulses in the area to which they are thus reflected. In other words, the sympathetic ganglia are to be regarded as so many stations situated on the lines traversed by vasomotor impressions, in which the "points," so to speak, are managed and by means of which impulses are transferred from one line to another.

The following diagram will illustrate, in a general way, the foregoing remarks.

FIG. 1.



A, sympathetic ganglion.

B, sensori-motor nerve.

C, afferent sympathetic fibres from sheath of B.

D, caudate cells.

E, efferent sympathetic fibres proceeding to artery F.

F, artery dilated.

f, normal size of artery beyond the sympathetic influence.

G, general vasomotor centre.

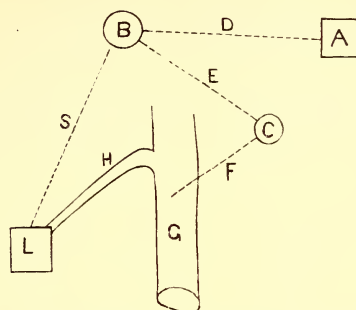
H H, the dotted lines indicating the course of the fibres forming the roots of the ganglion in the spinal cord to the general vasomotor centre G.

We can now report a class of cases which represent the reflex connection between the ear and the larynx, and we will first indicate simply, by means of Fig. 2, the anatomical relations between the organs.

The irritation of the sensitive fibres of the auriculo-pneumogastricus distributed in the meatus, and to the membrana tympani, is reflected along the motor fibres of the superior laryngeal nerve, exciting in the larynx the act of coughing, by causing contraction of the crico-thyroid muscle. Now, where the original irritant, either in the meatus or in the membrana tympani, by its continued presence involves the vasomotor fibres associated with the auricular nerve, they conduct their impression to the ganglion of the pneumogastric, and thence it is deflected through a sympathetic fasciculus proceeding from it to the first cervical ganglion, this again through the nervi molles carries the impression to the external carotid artery and by its branches to the mucous membrane of the larynx, and as a result of reflected vasodilator impressions we may have congestion of the vessels supplying the mucous membrane of the larynx and perhaps effusion from these vessels.

As examples of reflex irritation, having their origin in this way, may be mentioned the hoarseness which sometimes accompanies the impaction of cerumen, and which disappears almost immediately after the removal of the mass, and the case of a young girl who was relieved of a

FIG. 2.



- A, auditory canal, membrana tympani, and middle ear.
- B, second ganglion of vagus.
- C, first cervical ganglion of sympathetic.
- D, auriculo-pneumogastric nerve.
- E, sympathetic fasciculus connecting B and C.
- F, nervi molles vasomotor connection with external carotid.
- G, external carotid.
- H, laryngeal artery.
- S, superior laryngeal nerve.
- L, larynx.

persistent laryngeal cough of several months' duration, accompanied by excessive expectoration, producing extreme emaciation, by the removal of a bead from the external auditory canal. The reverse of these laryngeal symptoms reflex from the ear, is represented by that class of cases noticed by Tröltzsch and others, in which long-standing laryngeal disease is followed by deafness, and Gerhardt's case of severe pain in the ear, apparently depending on ulcerative destruction of the epiglottis.

The following is an interesting case of middle ear disease causing reflex laryngeal cough.

CASE III.—A child, five years old, who had been under our care for various diseases, and had developed purulent inflammation of the middle ear, was noticed, when under treatment for the otitis, to have a spasmodic, apparently laryngeal, cough, not to be accounted for by any abnormal condition of the air-passages. Whenever the discharge was checked, the cough was persistent, and resisted all the remedies which were employed to control it, but always grew less and frequently disappeared entirely, whenever the ear began to discharge again. This sequence of symptoms happened so frequently that there seemed to be no doubt that there was a connection of dependence between the discharge and the cough, and many an amusing appeal was made by the writers of this paper to each other, to allow the especial part to which they were directing their remedies, to remain quiescent, which only

ended by the baffled physicians sending the despairing parents abroad with the child, to a climate where a more complete cure could take place in the ear.

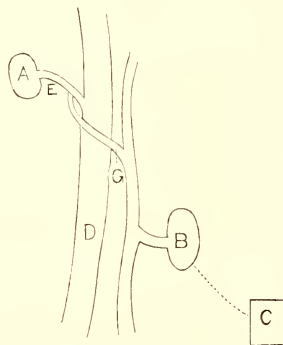
We will next report the reversal of the impressions conveyed by the filaments of the pneumogastric and the allied sympathetic fibrillæ, occurring in the second case described in this paper, in which aural disease was followed by pulmonary symptoms. This case is an illustration of the primary implication of the middle ear in pulmonary tuberculosis.

CASE IV.—A young man, twenty-three years of age, with marked tuberculosis of the right lung, complained of tinnitus aurium, and especially of a sense of fulness in the right ear, accompanied by decided impairment of hearing.

Examination of the ear showed congestion and œdema of the upper portion of the membrana tympani which was followed by perforation of the membrane of Shrapnell, and a serous discharge which soon became purulent, and was accompanied by a rapid breaking down of the tissues. A week later the same symptoms occurred in the left ear, with the same appearances, and the transition within four days to a well-established purulent otorrhœa. The left lung was also affected. In this, as in similar cases, a marked symptom is the absence of the severe pain which usually accompanies the inflammatory affections of the middle ear and membrana tympani. The anatomical connection of the parts is obviously through the pneumogastric ganglion B, Fig. 2, by means of the auriculo-pneumogastric nerve.

We can now, guided by the principles which we have above endeavored to elucidate, return to the study of those especial ear cases illustrated

FIG. 3.



- A, tympanic cavity.
- B, otic ganglion.
- C, tooth.
- D, internal carotid.
- E, tympanic branch.
- F, auriculo-temporal nerve.
- G, auricular branch of auriculo-temporal nerve.

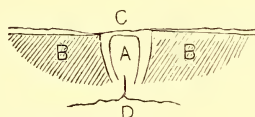
by the first case reported in this paper, in which there is congestion of the auditory structure arising from the irritation of teething, and we have

to ascertain how a congestion of the ear sufficient to give rise to severe pain can be caused in a reflex way by irritation connected with the teeth and gums, for clinically the occurrence of this phenomenon is quite frequently met with in infants during the dental periods. Woakes says :

“A considerable portion of the blood supply of the membrane of the drum is derived from an artery that leaves the internal carotid in the carotid canal and proceeds by a very short course directly to its destination. Being thus closely connected with a large arterial trunk, this small tympanal branch is very favorably situated for a speedy augmentation of its blood supply. Now the nervi-vasorum constituting the carotid plexus at this part of its course come largely from the otic ganglion. On the other hand, the inferior dental nerve supplying gums and teeth also communicates with this ganglion.”

We thus arrive at a direct channel of nerve communication between the source of irritation, the tooth, and the vascular supply of the drum-head. The vessels of the membrana tympani become largely distended, and the attendant stretching of the tense and sensitive tissue in which this occurs occasions the pain constituting “earache.”

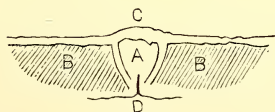
FIG. 4.



- A, tooth in bone socket.
- B, jaw.
- C, gum, soft, not inflamed or swollen.
- D, dental nerves.

Incidentally to the discussion of this subject of “dental earache,” it does not seem entirely out of place to say a few words about gum lancing—a procedure which in former years was so universal, and at the present time is discountenanced to an equal degree by certain writers of authority in pediatrics.

FIG. 5.



- A, tooth in bone socket.
- B, jaw bone.
- C, gum, tense, inflamed, swollen.
- D, dental nerves.

During the dental periods two classes of irritation are met with: (1) Irritation of the dental nerves from pressure in the bone socket caused by pressure at the root of the growing tooth, and the accompanying

symptoms commonly spoken of as "teething;" in this class of cases we especially have the reflex earache spoken of above. (2) Irritation of the gum over the crown of the tooth from pressure, with symptoms of local irritation causing fever, and with general nervous symptoms.

Now we have here two exactly opposite conditions:

1. Pain from pressure at root of growing tooth.
2. Pain from pressure at crown of growing tooth.

To relieve the symptoms of (1), we can easily see that lancing the flat, soft, unirritated gum C, in Fig. 4, can be of no possible use; while what better treatment can there be for the symptoms of (2) than freely to lance the hot, swollen, and tense gum C, in Fig. 5, as we would where it is possible in any part of the economy to relieve symptoms of pressure by abolishing the cause of the pressure? Lance, then, not as formerly in every case, but knowingly in the class of cases in which our common sense tells us that the gum is crying out for the lancet as plainly as the felon demands the bistoury.

The relationship of superficial cutaneous disturbances of the face to congestions of the upper portion of the membrana tympani and tympanic cavity, as is sometimes observed in the facial eruption of measles and in the cases of which the following is a type, is somewhat complex, the arterial supply of the tympanic cavity being derived from various vessels. The anterior and middle portions are supplied: 1, by branches of the ascending pharyngeal artery (from the external carotid); 2, by branches of the middle meningeal artery which penetrate through the hiatus canalis Fallopiæ and the fissuræ petroso squamoso into the tympanic cavity; and, 3, by the internal carotid which sends branches through the bony walls of its canal.

In the case in question, there was evidently a rapid congestion of the middle ear, with no other readily assignable cause than the one mentioned, and the mechanism of the suspense of vasomotor inhibition in this and similar cases, is a question which it is intended to make the subject of further investigation.

A stout, healthy man, about thirty years of age, without history or evidence of previous ear-trouble, was exposed for an hour or more while driving to a cold, raw wind in winter; his body, head, and face were thoroughly protected, with the exception of the right side of the face and cheek, which surfaces were, of necessity, continuously exposed.

On entering the house a sense of fulness was experienced in the right ear, followed, at the end of an hour in a warm room, by a slight pain, which, by the end of another hour, had become very severe. At this period examination of the ear showed the membrana tympani congested and swollen above, but transparent below, and bulging outward; paracentesis of the membrana tympani in the posterior inferior quadrant liberated, not fluid, but air, which escaped with a sharp hiss, and was

followed, within another hour, by a serous fluid, the outflow of which rapidly increased for a time and then continued, gradually decreasing, for three days.

The fact that the bulging outward of the membrana tympani was due to compressed air, and not to accumulated fluid, as was shown by the paracentesis, is a marked symptom in this case, and was probably due to rapid swelling of the mucous membrane, first closing the Eustachian tube and then encroaching upon the lumen of the tympanic cavity sufficiently to compress the imprisoned air, and force the membrana tympani outward, and would imply that the first impulse to congestion occurred in the Eustachian tube and anterior portion of the tympanic cavity. If this conclusion is correct, the mechanism of the suspended vasomotor inhibition would be explained by the distribution of the superior maxillary nerve, which, with Meckel's ganglion, supplies the integument above and over the malar bone and that of the lower eyelid, side of the nose, and upper lip; while the connection with the ascending pharyngeal, tympanic branch, may be supplied, either by the pharyngeal nerve, which is sometimes given off from the ganglia, and sometimes directly from the Vidian, or by the small nasal branches of the Vidian which supply the membrane of the Eustachian tube.

The possible reverse train of symptoms to those of this case is presented in the following instance of reflex irritation: A boy, eight years old, who, from time to time, had had inflammation of the middle ear, but who for some months had been free from ear-trouble, after being out in the morning (the day was mild) came home with the right side of his face swollen; the swelling, which was neither red nor painful, and was not accompanied by fever, also affected the right eye, and extended over to the left eye; careful examination failed to detect any lesion to account for the symptoms, either in the mouth or elsewhere. Unfortunately the ear was not examined at this time.

In the night the child complained of slight pain in the right ear, followed in a few hours by a mucopurulent discharge, and by morning the swelling of the face had entirely disappeared, and there was a well-established otorrhœa.

In this connection we must now speak of an exceedingly important class of cases represented by the exanthemata, as here, also, there appears to be a reflex relationship between the face and the ear.

The implication of the middle ear in scarlet fever, for instance, occurs in two distinct ways: the first, and by far the most frequent, is that in which an inflammatory process in the middle ear is the secondary result of the inflammation of the mucous membrane of the fauces and nasopharynx, the first step in the mechanism of the aural implication being a more or less general congestion of the tympanic mucous membrane, blood stasis, due to the swelling of the mucous membrane of the Eus-

tachian tube and the consequent closure of that passage, a condition which permits the rarefaction of the air in the tympanic cavity, and consequently still further favors congestion in addition to the interference with the venous circulation.

In the second instance the primary congestion occurs principally in the upper portion of the tympanic cavity and membrana tympani, and is coincident with the facial eruption, a sequence explainable on the reflex hypothesis; the same sequence is still more frequently observable in the facial eruption of measles.

An illustration of this second instance was beautifully represented in a patient coming under our notice with an intense efflorescence of measles on the face and no aural symptoms; on examining the ears, however, a marked congestion was found in the upper part of the membranæ tympani.

The next and last case of our series represents a rather more extended line of reflex symptoms, and though resembling some of the other cases, is interesting as presenting a combination of reflex phenomena from the face and throat to the ear and thence to the lung.

A girl, aged nineteen months, well until March 6th, when she began to have cough, coryza, and lachrymation; these symptoms continued on the 7th, and an efflorescence of measles declared itself on the face. Temperature $104\frac{1}{2}^{\circ}$ F., pulse 150, respiration 40; on the 8th there was no extension of the efflorescence, and at 4.30 P.M. there was a general eclamptic attack, but consciousness returned at 5 P.M., cough less and apparently caused by a catarrhal condition of the pharynx and larynx, lungs normal, efflorescence appearing on body and limbs; in the night great restlessness and apparently pain, which, however, could not be localized, though it was suspected to be in the chest, as the respirations began to increase and to be of a short grunting character; these symptoms continued until at 5 A.M., March 9th, the respirations numbered 70 to 80 in a minute, and the picture was that of a pneumonia; frequent auscultation and percussion revealed nothing abnormal in the lungs or heart; at 6 A.M. a slight mucopurulent discharge was noticed on the pillow, coming from the left ear; the temperature was then found to be a degree lower, but the rapid breathing continued. The left Eustachian tube was now inflated, and in about ten minutes the respiration was almost normal; in the further progress of the disease, the measles ran a normal course, but the right ear was also affected and both ears continued to discharge. A number of times the rapid respiration returned, and was always promptly relieved by the use of the air douche.

Rational treatment of these cases, then, can only be accomplished by a thoroughly scientific anatomical and physiological knowledge of the reflex phenomena, which, from the hypersensitive condition of the child's

nervous system, play a much greater *role* in childhood than in adult life and render a diagnosis much more difficult.

Finally, from what has been said, we must admit the great importance of recognizing whether symptoms are real or reflex, tracing them from one end of the labyrinth of nerves to the other, and following them out with the minutest detail, for in this way only can we speedily reach the goal of recovery through definite and exact diagnosis, with resulting appropriate prognosis and treatment.

YELLOW FEVER:

ITS TRANSMISSION BY MEANS OF THE CULEX MOSQUITO.

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IN the month of May, of last year, when the yellow fever epidemic was commencing at Vera Cruz, Dr. Carmona, of Mexico, inoculated six prisoners with the dried residue of yellow fever urine. In two of the six, the local symptoms of the inoculation were immediately followed by those of fatal yellow fever, and, a few days later, both died *on the same day* (Carmona, *Leçons sur l'étiologie et la prophylaxie de la fièvre jaune*, p. 265). This unfortunate result agrees with the views that I have entertained since 1881, viz., that whereas the disease is not spontaneously transmissible by infection through the air nor by contact, it can be communicated by inoculation. In searching for a natural agent capable of fulfilling this condition, I was led to fix upon the *Culex* mosquito as the most likely one. Before submitting, however, the experimental results which, so far, appear to confirm my theory, it will be necessary to describe the habits and peculiarities of this insect.

Most books on natural history inform us that only the *female* mosquito stings human beings and animals for the purpose of sucking their blood, the *males* feeding only on sweet juices or nutrient liquids. The fecundated females, in cold climates, hibernate during winter, in a state of apparent death, in dark corners, in cellars, etc., to revive with the return of warm weather, when they will lay eggs and propagate their species. I was unable, however, to ascertain from previous writers whether gnats, in general, suck blood more than once, how long they live after their first bite, and many other particulars essential for my investigation. I was, therefore, obliged to undertake a systematic study of the species generally found in Havana, to which alone the following remarks must be understood to apply, leaving future inquiries to deter-

mine whether the same may be true of others that are known to exist in the interior of the island and in foreign countries.

Two species of mosquitoes are commonly observed in Havana. One, the *Culex cubensis* (La Sagra), *zancudo*, or long-legged mosquito, is from five to six mm. in length, of a yellowish or fawn color, with long, thin legs, and no noticeable spots upon its body or legs. This species is nocturnal, coming out exclusively at night and retiring before daybreak; they are often found in the morning, in a state of torpor, gorged with blood, inside of mosquito nets. I have never succeeded in getting these *zancudos* to sting a second time after they had once become filled; but as they can be kept alive, by feeding with sugar, over a period of forty days, it is unlikely that they should not bite more than once when in a state of freedom. The female of this species lays its eggs pretty much in the same manner as the European gnat, described by Reaumur, forming a boat-like aggregate of eggs, where over one hundred are closely packed together, standing upright, side by side, the tiny raft being left floating upon the water.

The other species is the *Culex* mosquito (Robineau Desvoidy), lately described, I am told, as "*Culex fasciatus*." There are several varieties, principally distinguishable by their dimensions and shades of color; some being small and nearly black, while others are stronger, almost as large as the nocturnal species, and of a brown or steel color; the general characteristics being the same in the two or three varieties that I have observed.

The body of the *C. mosquito* is dark colored, the ventral surface coated with a thick skin and marked with gray or white rings; on each side of the abdomen is a double row of white dots, between which stretches a transparent membrane through which the blood can be seen when the insect is full. The most striking feature consists in five white rings on its hind legs, corresponding to the tarsal and metatarsal articulations. Others less apparent are on the fore and middle legs; white spots are visible on the sides of the thorax and front of the head, while the corselet presents a combination of white lines in the figure of a two-stringed lyre. The wings, when closed, do not cover the end of the body.

The *males* are known by their bushy antennæ and long palps lying close to the proboscis, and curved outward near the point; whereas the *females* have delicate antennæ and short palps drawn up close to the root of the proboscis.

The female of this species lays its eggs in a different manner from the *zancudo*, not in a boat-like aggregate but singly, having previously deposited a viscous substance through which they lie scattered in irregular groups, either upon the liquid surface or upon the sides of the vessel, close to the water's edge.

The above details are easily made out with the aid of a magnifying

glass. I need not enter upon a minute description of the six pieces which constitute the sting of the female mosquito (labrum, mandibles, maxillæ, and tongue); suffice it to say that, in the act of biting¹ and sucking blood it represents a hollow lance, from 2 to $2\frac{1}{2}$ mm. long, $\frac{1}{30}$ mm. broad at its base and about $\frac{1}{40}$ near its extremity. The point is shaped like that of a writing pen, its edges being provided with ten or twelve sharp teeth decreasing in size as they reach the finely pointed extremity. The shaft presents transverse serrated ridges, which must act somewhat like the teeth of a conical file; these ridges, as well as the terminal teeth, belonging to the mandibles which are closely applied upon the sides of the labrum.

The sting remains enclosed in a brown, hairy sheath, excepting when it is introduced into the skin; during this operation, the sheath, which is slit in front to within a short distance of its point, bends backward and the sting appears like a fine wiry lance. This generally penetrates to a depth of from $1\frac{1}{2}$ to 2 mm. before a bloodvessel is reached of sufficient calibre to allow blood to be drawn. The insect requires from one to five or seven minutes to complete this operation. When once it has fairly implanted its sting, the mosquito can be easily covered with a glass tube or phial and imprisoned. I have generally resorted to this means in order to procure live specimens, so as to be sure of their efficacy for my experiments.

The *C. mosquito* is diurnal and crepuscular, making its appearance early in the morning, again between 9 and 10 A. M., and in the afternoon until night. Stragglers may be met as late as 10 or 11 P. M., and in close, dark rooms they are generally felt or heard throughout the day (in summer). The males are the first to make their appearance, apparently attracted by the emanations of human perspiration from the body or from worn clothes; they keep flying about until the females appear, and it is only after pairing that the new females are able to sting and draw blood. When caught as they emerge from their pupa-case, they often attempt to do so, but their proboscis bends, either from want of rigidity of the sheath, or from some obstruction at its point, and the lance fails to pierce the skin. Immediately after pairing, however, the insect is ready to sting.

I have found no difficulty in getting this species to do so as often as it has completed the digestion of the blood previously sucked, but not before an interval of from two to five days (according to the season and weather), when the insect had been able to fill itself completely. As a proof of the remarkable resistance of this insect to rough usage, and in order to exemplify some of its habits, I copy the following record from my note-book :

¹ This term is used in accordance with general custom notwithstanding its obvious inaccuracy.

January 13, 1881. A fresh female *C. mosquito* was caught in the afternoon and allowed to fill with blood off my hand, being retained captive in a glass tube closed with a muslin cap.

15th. Filled again from my hand, biting through the muslin cover.

16th. Strong and active; still distended with blood, refuses to sting.

17th. Stings my hand readily through the muslin and fills.

18th. Though still retaining some blood, bites my hand readily through the muslin. Two hours later, not having apparently taken its usual quantity of blood at the previous bite, it stings again and sucks during two minutes. (Probably the interposition of the muslin interferes with the act of sucking.) At this period, knowing that only the fecundated females draw blood, I introduced a small quantity of water into the phial, in order that eggs might be laid. The insect immediately goes to the water, and after discharging a whitish viscid substance upon the sides of the tube, deposits some white eggs, close to the edge of the water. Six of them were disposed vertically one above the other. The rest of the day the insect was busy besmearing every part of its body (legs, wings, and head included) with a viscid substance collected with the hind legs from the posterior extremity of the body. The white eggs turned black after some hours.

19th. Continues laying eggs.

20th. More eggs; some upon the sides of the phial; stings my hand and sucks readily. The water becomes colored red from the excrementitious particles discharged into it.

21st. Refuses to sting; has lost its left hind leg.

22d. Still laying. One small wriggler has been hatched. Cannot be got to sting.

23d. More eggs laid. Refuses to sting.

24th. The water is teeming with wrigglers. The insect was now transferred to another phial with water. Stings my bare hand very readily, taking about seven and a half minutes to fill.

25th. Refuses to sting. No new eggs.

26th. Bites readily, but, unable to reach a bloodvessel, withdraws its sting, and after feeling the surface of the skin, finds a more convenient spot, where it fills completely.

27th. Refuses to sting. In moving the phial the insect was soaked by the water, but recovered.

28th. Has laid over fifty eggs since yesterday evening; bites readily, and fills from my hand.

29th. Refuses to sting. No new eggs. Most of the white marks upon the body of the mosquito have nearly disappeared.

31st. Bites readily, and fills from the palm of my hand.

February 2. Bites, and fills from my thumb. Having been transferred to another phial with fresh water, was found lying partly submerged and motionless. On filtering off the water the insect revived. It was then transferred to a new dry phial for the purpose of continuing the observations during my trip to New York.

3d. Still retains some black blood; has lost its left foreleg.

4th. Bites, and fills from my hand. Taken on board of the steamer starting for New York.

5th. Refuses to sting.

6th. Bites, and fills readily.

7th, 8th, 9th, 10th. Alive, but refuses to sting. The weather was quite cold, the last three days passed off Sandy Hook.

12th. The phial, packed in a valise, was sent by express to Orange, N. J.; the insect arrived nearly dead.

13th. Dead, after thirty-one days captivity, having bitten twelve times, and laid probably over two hundred eggs.

From inquiries made on the steamer, I ascertained that mosquitoes are rarely felt on board during the three or four days that the vessel is detained in the port of Havana, where she lies at a distance from the wharves. In New York, where the ship goes to the wharf, they are apt to be more troublesome, but generally disappear soon after the vessel has left the port.

Mosquitoes are observed in Havana all the year through, but much more so from May to October. In winter they are rare when the temperature falls below 70° F. Last year (1885) has been an exception to the general rule. Mosquitoes, especially the diurnal species, were difficult to procure throughout the summer; but became more numerous in the latter part of September, October, and November. A remarkable scarcity of yellow fever cases was likewise observed in the summer months, and I called attention to this coincidence at one of the sessions of our Academy. In October and November more cases of the disease were signalled, both in hospital and private practice, than in the previous months of the year, although the summer heat had been more intense than usual, and had abated toward the end of September, in October and November the weather being quite mild.

Although great differences are observed in the duration of the successive phases of development of the *C. mosquito*, the following data may be taken as a fair average: Every mosquito that stings may be considered as a fecundated female, and will probably lay eggs within a few days after its bite, provided it can find water upon which to lay them. In water-jugs standing in bedrooms, the insect is often found depositing its eggs either on the sides of the jug or upon the water. The eggs are commonly hatched, producing minute wrigglers, between the second and fourth day, in summer; some are delayed much longer, and those that are deposited outside the water may remain a long time in the dry state without losing their vitality. The wrigglers grow more or less rapidly according to the nutritive material contained in the water, the temperature, etc., but they probably pass into the pupa stage within twelve or fourteen days. This stage is always short, not lasting more than two or three days, the fully developed mosquito emerging from its aquatic case a fortnight or three weeks after the egg was laid.

From the above data it will be understood how a single infected mosquito, which happens to be conveyed to a healthy locality, when the temperature and altitude are appropriate, might, if my theory be true,

inoculate the disease to any liable subject whom it should there sting; and, according to the usual rate of incubation, at the end of a fortnight or three weeks, the consequent attack of yellow fever would be at its height. In the meantime the imported insect would have produced a whole brood of its own species, probably in the vicinity of the place where the patient is lying; thus providing the necessary conditions for the subsequent propagation of the disease.

It remains, therefore, to be determined whether the limits of temperature and of altitude within which the *C. mosquito* is able to exert its functions, agree with those which are known to limit the propagation of yellow fever. The following simple experiments appear conclusive on these points:

1. Let a female *C. mosquito*, of medium size, be placed in a test-tube with a thermometer passing through the cotton-plug, and the tube dipped in water, the temperature of which is gradually lowered by the addition of ice and salt. The following effects will be observed:

Between 66° and 60° F., the insect is benumbed, scarcely moving, sometimes falling to one side in a state of apparent death.

Between 60° and 32° F., apparent death more pronounced.

If the water be allowed to return to its former temperature:

Between 60° and 65° F., the insect shows signs of life.

Between 65° and 68° F., it is able to walk and fly.

Above 77° F., it recovers its former agility, but is at first unable to bite; indeed, if the cooling has reached 32° F., or below, the insect generally dies within a short time.

The larger varieties seem, however, to bear low temperatures better than the small, and a difference is observed according as the change is effected more or less rapidly.

2. In order to test the limits of heat, let a test-tube, similarly disposed, with a thermometer and live mosquito, be suspended inside of a large empty flask, standing in a basin of hot water. The following effects will be noted:

Between 95° and 100° F., the insect appears uncomfortable.

Between 102° and 105° F., remains motionless in apparent death, but is apt to recover and to sting again when restored to a normal temperature.

From 105° to 110° F., apparent or actual death; the insect, if it does revive, not being able to sting again, and generally dying within a few hours.

3. As regards barometric pressures, the experiment would best be tried in such localities as Vera Cruz, Orizava, and Mexico, or in Rio Janeiro and the heights near it, but, failing that resource, I have contrived the following plan:

A female *C. mosquito* is placed in an empty bottle connected with an aneroid barometer, and a suction flask raised to a proper height:

At rarefied pressures corresponding to 2000 or 3000 feet, the insect becomes at first unable to fly, but if withdrawn will bite and draw blood after a while.

At rarefied pressures corresponding to 4000 or 6000 feet, the general effects are more marked, but the insect does not die, and seems even to

get accustomed to the new state of things; but when withdrawn continues weak, and unable to sting for several hours.

We are thereby led to infer that the *C. mosquito*, when suddenly transferred to heights above 3000 or 4000 feet, must find it difficult to exert its functions, and that it would never, of its own accord, seek elevations which render its flight difficult. This conclusion agrees, moreover, with the remarks of Baron von Humboldt, who carefully observed the mosquitoes of Central America.

From the above experiments it is inferred that the limits of functional activity for the *C. mosquito* are: as regards temperature, between 60° and 100° F., the insect reviving, however, after having been chilled to near 32° F., or warmed to 105° F.; as regards altitude, from the level of the sea to 3000 or 4000 feet. Now the limits which most observers assign to the propagation of yellow fever are temperatures ranging from 60° F. to 90° F. ("Barton's Reports," 1852, pp. xiii. and 283); a general temperature of 32° F. having, however, proved ineffectual to prevent the recurrence of the disease (in the case of the "Plymouth"), when a tropical temperature was produced. As regards altitudes, the highest limit at which it has been observed seems to be 4000 feet above the level of the sea.

Before dismissing the subject under consideration, I must add that the mosquito finds within the precincts of a dwelling all the requirements for its development, growth, and reproduction; dark corners to hide in, stagnant water in which to lay its eggs and develop its larvæ, and substances for the female insect to feed on, being the principal conditions. A forgotten tub, or pool of stagnant water in a back yard or garden, is often chosen by the insects as a place of rendezvous where they congregate and lay their eggs; the larvæ, in the meantime, going through their successive stages of development. The mother insect when about to die, has been observed to resort to the water where its larvæ are growing, its cadaver remaining floating upon the liquid surface. The nocturnal species will naturally lead a more stationary existence than the diurnal; for the latter, in trying to sting during the busy hours of the day, will often have to follow its intended victim from house to house, returning again and again after being driven off, until it succeeds in planting its sting and filling with blood. Wherever the bite happens to have been successful, there the mosquito will, in all likelihood, take up its quarters; it will develop a new brood and continue to sting all that come in its way, unless again led off by a chance peregrination.

Before relating the following six cases of experimental yellow fever, it will be proper to explain the general principles by which I was guided, and the process which I have followed in my inoculations.

The general disposition of the *C. mosquito's* sting has already been described, but for our present purpose it may be regarded as a slender

hollow needle from $\frac{1}{30}$ to $\frac{1}{40}$ mm. broad and 2 mm. long, with its sides roughened by a series of transverse ridges and its point armed with teeth. This needle penetrates through the skin until it reaches one of the capillaries of the corium, generally to the depth of 1 to 2 mm., remains in position during a space of from one to five minutes, and, after being withdrawn, will continue protected by its sheath against external agents until the insect's next bite. I have been able to prove that the sting often retains spores of microscopical fungi, which may be made to develop by keeping the proboscis in a sterilized cell, and I once found upon the side of the sting a finely developed bunch of spores like those observed in yellow fever blood cultures by Dr. Sternberg (*Bacteria*, 2d edition, p. 426), and classified as "Penicillium;" whence it is to be inferred that it may likewise retain upon its outer surface or inside of its sheath, such minute disease-germs as are generally believed to occasion most of the zymotic diseases. If so, the sting of the mosquito having been impregnated with the animal juices during the operation of stinging, may constitute an appropriate soil for the preservation or even for the culture of those germs; might it not, indeed, be the "intermediate host" necessary for some phase of their development?¹

For the purpose of carrying into effect this novel inoculation, my plan has been to catch a female mosquito while in the act of stinging and before it has filled, by inverting an empty phial or test-tube over it and closing the mouth of the phial with a plug of cotton-wool. The insect is thus in readiness to renew its bite as soon as it has become accustomed to its place of confinement. Indeed, it will die of inanition if not allowed to do so in the course of a few hours (four to twelve in summer). The captive is then taken to a confirmed case of yellow fever, and the tube being inverted and the cotton plug carefully removed over the bare surface of the patient's arm or hand, the insect is allowed to fill at leisure with the tainted blood, and the plug reinserted. After this blood has been digested, generally between the second and fourth day, the mosquito is applied in the same manner to the arm of a subject liable to the disease, and then allowed again to fill itself completely. This is the inoculation; and when successful, at the end of from five to twenty-two days incubation, the first symptoms of mild yellow fever will manifest themselves in the inoculated subject.

The process, as above described, is simple enough, but it must be observed that in order to obtain available results several conditions are necessary. A case of yellow fever must be at hand at the period most favorable for the transplantation of the virus, which, according to my

¹ In resolving to experiment upon human subjects, I relied upon the inference that the quantity of virus carried by a single sting must be a minimum dose, capable of producing only the mildest forms of the disease ever observed in nature, and that a number of such bites would be necessary to occasion a dangerous attack.

experiments, seems to be from the third to the sixth day. A liable subject must be found willing to submit to the process, supposed to be free from previous infection, and likewise willing to keep clear from infected places during the incubation, yet within easy reach of observation.

The nocturnal species of mosquito can easily be procured, but, as before stated, I have never succeeded in making that particular kind sting more than once; whereas, the diurnal, which is the only one that I have experimented with, does not generally come in swarms, but singly, or in small numbers, making but little noise, and its bite is usually unfelt, at least by the acclimated.

These requisites, so difficult to be obtained by one whose leisure hours, in the midst of an active professional life, are necessarily limited, will account for the small number of my experiments, some twenty-four individuals only having been inoculated by me since June, 1881. Of this number only one has died of yellow fever; he had been inoculated in November, 1883, without any visible result, and was attacked, after severe exposure, in June, 1884, with a malignant form of yellow fever (it is the second case of the series referred to elsewhere as instances of contagion). Of the remaining twenty-three, two left the country, or were lost sight of the first summer after inoculation, the rest having remained under observation during periods ranging between one and four full summers in the city of Havana. Six of these inoculations were followed, within the ordinary limits of yellow fever incubation (five to twenty-two days), by an attack of fever, the exact counterpart of mild attacks of yellow fever, of which I have kept careful notes, and which were proved by subsequent observation to have conferred immunity. Eleven inoculations, though not followed by any morbid manifestations within the limits of incubation, or, at most (in three cases), by a trifling ephemeral fever, appear to have likewise conferred immunity, in so far that the persons have resided in the city of Havana, in constant exposure to the infection, during periods of one or two summers, without experiencing any attack of the disease. Finally, in four instances, not followed by any immediate morbid manifestation, at the end of several months a mild attack of yellow fever (without albuminuria) was observed.

These figures are not considered, from a statistical point of view, to afford any definite clew either in favor of or against the prophylactic value of my inoculations when not followed by a mild attack of the disease, and it is rather upon the circumstances attending my six successful inoculations that I rely in order to prove the aptitude of the *C. mosquito* for transmitting yellow fever. If this be once admitted, it must follow that the disease is actually so transmitted, since it must constantly happen, in a place like Havana, that unacclimated subjects

are stung by mosquitoes which have previously bitten yellow fever patients.

My first inoculations by means of mosquitoes were performed under the following circumstances: A group of twenty unacclimated soldiers, who were quartered on the heights of the Cabanas, on the other side of the bay, were picked out for my observations, and were only allowed to cross the bay in batches of four or five on the days they were sent to my office, where I tried their blood for hematimetric purposes. Five of the group were inoculated by me at different dates between the 29th of June and the end of August, 1881. The first three were followed, at the end of five or fourteen days' incubation, by an attack of fever of several days' duration, diagnosticated by the attending physicians at the military hospital as "regular yellow fever" in the first case, and "abortive yellow fever" in the two others. The fourth inoculated soldier suffered only from continued headache, and, on the fifteenth day after the inoculation, came to my office with slight fever (temperature 100.7° F., pulse 100), but was not laid up. The fifth did not return to my office. I was informed that he had felt poorly a few days after the inoculation, but was not laid up. I have been able to trace the history of these five cases until the beginning of last year. None of them had been reported, up to that date, as subsequently attacked with yellow fever. Of the remaining fifteen soldiers of the group, upon whom the inoculation *was not performed*, none were attacked with yellow fever during the period of my observation, June 28 to September, 1881.

CASE I.—On the 30th of June, 1881, one of the soldiers of the above group (F. B.), twenty-two years of age, three months in Havana, having had previously some attacks of intermittent fever, was inoculated by means of a mosquito which had bitten, two days before (June 28th), a patient in the fourth day of yellow fever and who died thirty-six hours later.

July 14. The inoculated soldier was taken sick and went to the Military Hospital, where I was only able to see him on the 16th (third day of his illness). I found him with slight fever, slight yellowish tinge of conjunctivæ, pains of invasion almost disappeared; the urine gave distinct evidence of albumen with heat and with nitric acid, not having presented any in the morning. The clinical report of the attending physician, together with my own observation, gave the following result.

1st day, July 14. Invasion preceded by a few days of discomfort.

2d day. Morning: Temp. 101.8° F.; pulse 92; resp. 28; face and eyes injected; intense headache; slight epigastralgia; pains in the spine; tongue coated; no vomiting or other remarkable symptoms. Treatment: Ipecacuanha four grammes in four doses; cream of tartar lemonade; absolute diet. Evening: Temp. 100.4° F.; pulse 88; resp. 26; headache less intense. Night: Intense thirst; urine scanty.

3d day. Morning: Temp. 99.6° F.; pulse 72; resp. 34; skin pale; slight yellowness of conjunctivæ; congested gums; epigastralgia; no nausea; no albumen in the urine. Evening: Albumen detected in the urine. Night: Same condition; insomnia. Treatment: One gramme of sul-

phate of quinine in ten doses; cream of tartar lemonade; mustard plasters to the extremities.

4th day. Morning: Temp. 98.9° F.; pulse 72; resp. 34; no headache; some appetite; gums give a little blood on compression; urine treated by heat and nitric acid, gives a more abundant precipitate of albumen. Evening: Normal temperature and pulse.

5th day. Temp. 98.9° F.; pulse 78; respiration normal; slight jaundice; urine contains albumen.

6th day. Convalescent; urine not examined; broth allowed.

7th day. Continues well.

12th day. Cured.

The distinct evidence of albumen in the urine, notwithstanding the mildness of the fever and general symptoms, leaves no doubt regarding the diagnosis, which was unhesitatingly reported as "regular yellow fever."

CASE II.—Another soldier of the group (A. L. C.), seventeen years of age, three months in Havana, was stung on the 22d of July, 1881, by a mosquito which had bitten, on the 16th, a bad case of yellow fever (in fifth day of his illness), and on the 20th had been made to sting my own hand.

July 27. Five days after the inoculation, this soldier entered the Military Hospital with an attack of fever, which was qualified as "abortive yellow fever." When seen by me on the 31st (fifth day of his illness), there was scarcely any fever, and the urine contained no albumen. I was unable to procure the clinical notes of this case.

This observation would tend to prove that an infected mosquito does not always lose its virulence by an intermediate bite. This is not always the case, however, for on a subsequent occasion, having inoculated with a mosquito which had bitten two yellow fever patients, a person who seems thereby to have acquired subsequent immunity, the same insect was afterward made to sting a second non-acclimated person, who had a severe attack of yellow fever six months later, from which he fortunately recovered. This case has not been included among my regular inoculations, being considered a distinct experiment.

CASE III.—A third soldier (D. L. F.), twenty years of age, and six months in Havana, was inoculated on the 31st of July, 1881, with a mosquito which had bitten, two days before, a fatal case of yellow fever in third day of the disease. On the 5th of August (five days after the inoculation) the soldier came to my office, presenting temp. 39.6°, and pulse 110. He was at once sent to the Military Hospital, where the following clinical record was taken:

1st day, August 5. Evening: Temp. 103.2° F.; pulse 112; intense headache; slight epigastralgia; flushed countenance; intense thirst. Treatment: Valerianate of quinine two grammes in twenty pills; mustard plasters to the extremities; cold applications to the forehead.

2d day. Morning: Temp. 100.7° F.; pulse 72; resp. 28; the pains have lessened; some nausea; subicteric tint; urine pretty abundant, contains no albumen. Evening: Temp. 101.8° F.; pulse 88. Night: Temp. 100.7° F.; pulse 82; insomnia.

3d day. Morning: Temp. 99.6° F.; pulse 76; perspiration; no pains. Evening: Temp. 100° F.; pulse 80; restlessness.

4th day. Apyrexia.

The diagnosis, as stated in the clinical report, was "abortive yellow fever."

The following year (1882) my attention was principally devoted to the observation of mild forms of yellow fever, in order to collect reliable data available for the appreciation of my experimental cases. In 1883, however, I resumed my experiments, obtaining three successful inoculations, one of which (Case V.) is particularly worthy of notice.

CASE IV.—A Spaniard (J. B.), employed as a servingman to my friend Dr. Delgado, twenty-five years of age, nine months in Havana, having never been ill since his arrival, was inoculated on the 22d of June, 1883, by two mosquitoes, which had both bitten, two days before, a fatal case of yellow fever in the sixth day of his illness.

July 9th (seventeen days after the double inoculation), J. B. was taken ill with symptoms of yellow fever. The following morning an emetic was administered, followed by a dose of castor oil; no other medicine being given in the course of the illness, and absolute diet maintained until the sixth day, only water being allowed.

2d day. Morning: Temp. 101.3° F.; pulse 80; face flushed; pains in the loins. Evening: Temp. 101.8° F.

3d day. Morning: Temp. 100.4° F.; pulse 70; no albumen in the urine. Evening: Temp. 101.8° F.; face less flushed; straw color of the conjunctiva; intense thirst; anorexia.

4th day. Morning: Temp. 99.5° F.; pulse 68; no albumen. Evening: Temp. 101.3° F.; pulse 70.

5th day. Morning: Temp. 100.4° F.; pulse 68; no albumen; conjunctiva yellowish; gums do not bleed on pressure.

6th day. Morning: Temp. 101.4° F.; pulse 72. Midday: Temp. 103.1° F.; pulse 72. Evening: Temp. 103.2° F.; pulse 70.

7th day. Morning: Temp. 98° F.; pulse 54; yellowish tinge on the forehead; no pains; has perspired freely in the night; milk allowed. Evening: Temp. 98.6° F.; pulse 52; appetite returning; rapid convalescence.

The general type of the fever, with remission on the fourth day, and defervescence on the seventh, bears a strong resemblance to some forms of natural yellow fever that I have observed. The patient has since remained protected.

The following case is remarkable from the circumstance that most of the conditions were fulfilled that can well be secured in the vicinity of Havana, in order to avoid the chances of independent infection from other sources besides the inoculation. The place selected for the experiment was the same country residence or "Quinta" rented by the Jesuit Fathers since 1872, near the "Quemados de Marianao," to which Dr. Stanford E. Chaillé has alluded in his remarkable report as President of the Yellow Fever Commission which visited Havana in 1879 (*Annual Report of the National Board of Health*, Washington, 1880,

p. 276). In the course of eleven years (1872-1883), the only case of yellow fever developed among the many liable subjects who had spent their summer vacations at this place, during their stay, occurred in 1880 in a young priest who had been going backward and forward to Havana during the previous fortnight, and who was attacked with the disease during his last visit to the city, where he remained and died. It is more than likely that he had contracted the infection in town, and not at the Quinta.

Toward the end of June, 1883, several young priests and a servant, all unacclimated and having arrived from Spain the previous autumn, happened to be staying at this country-place, and I availed myself of their willingness to submit to my inoculation experiments.

CASE V.—P. U., one of the unacclimated priests, a young man of spare habit, having gone to the "Quinta" toward the end of June, 1883, did not again visit the city nor the neighboring town of Marianao until the following September. On the 15th of July a first unsuccessful attempt was made with a mosquito contaminated from a case in the seventh day of yellow fever; a full month was then allowed to elapse before a second attempt on the same person.

August 18, 1883, P. U. was inoculated with a mosquito which had bitten on the 13th and 16th two separate cases of yellow fever, each in the sixth day of their illness.

On the 26th of August, eight days after inoculation, P. U. was taken ill about 8 A. M. with headache, pains in the loins, and fever (temp. 100.7° F.). I saw him at 4 P. M. and from that time followed the case, keeping accurate notes of the symptoms.

1st day. 4 P. M., felt very poorly, complained of headache and pains in the loins and calves; face flushed and covered with perspiration; eyes injected; was sent to bed, and after a while presented: Temp. 102.2° F.; pulse 100, dicrotic. Treatment: Castor oil with lime juice. Night: Temp. 102.3° F.; pulse 104; vomited five or six times through the night and had several passages; thirst; eyes injected.

2d day. Morning: Temp. 101.3° F.; pulse 88; resp. 20; eyes injected, without yellow tinge; urine natural in appearance. Evening: Temp. 101.4° F.; pulse 90; resp. 30; somewhat drowsy; urine less copious than usual, acid reaction, not affected by boiling. Treatment: Hypo-sulphite of soda; boiled orangeade for common drink.

3d day. Morning: Temp. 101.8° F.; pulse 80; resp. 27; urine contains no albumen; restless night, insomnia; tongue white; thirst; face less flushed. Evening: Temp. 101.8° F.; pulse 84; resp. 26; subicteric tinge of conjunctivæ. Same treatment.

4th day. Morning: Temp. 100.4° F.; pulse 60; resp. 27; subicteric tinge more marked; the pains have ceased; urine scanty, contains biliverdine, but no albumen; the gums bleed on pressure. Treatment: Chlorate of potash. Evening: Temp. 101.4° F.; pulse 80; restlessness; urine scanty, no albumen; thirst; anorexia.

5th day. Morning: Temp. 101.1° F.; pulse 76; resp. 29. Evening: Temp. 101.8° F.; pulse 83. Night: During a thunderstorm became very nervous; ten hours without passing urine; urine presents traces of albumen. Treatment: Morphia syrup.

6th day. Morning: Temp. 101.8° F.; pulse 72; urine not altered by ebullition; quiet night; expectorated some bloody sputa. Broth allowed. Evening: Temp. 100.7° F.; pulse 75.

7th day. Morning: Temp. 99.6° F.; pulse 62; resp. 20; subicteric tint of conjunctivæ; some bloody sputa; gums bleed on pressure; urine scanty, no albumen. Evening: Temp. 98.9° F.; pulse 57.

8th day. Morning: Temp. 98.7° F.; pulse 58; subicteric tint of conjunctivæ.

It is worthy of notice that this patient in his normal condition presented a *polyuria insipida*, amounting to over two litres per day; the secretion becoming immediately reduced from the invasion of the attack.

The patient spent two summers in the city after this attack, visiting cases of yellow fever, and having witnessed two severe ones in the town-college where he resided, without experiencing any inconvenience.

CASE VI.—The unacclimated servant before mentioned, who was staying at the Jesuits' "Quinta" with the preceding case, and upon whom a first unsuccessful attempt had also been made on the 16th of July, was again inoculated on the same day as P. U.

August 18. This servant (J. S.) was stung by a mosquito which had bitten, three days before, one of the patients of yellow fever from whom the previous case was produced. J. S. remained at the "Quinta" until September 3d, at which date he had to return to the college in town. He was taken ill on the 9th and went into a private hospital, where I was able, with Dr. Delgado's assistance, to follow up the case.

1st day. Twenty-two days after the inoculation, taken ill in the evening, with fever, headache, and pains in the loins.

2d day. Midday: Temp. 103.1° F.; pulse 94; copious perspiration; headache; pains in the loins; eyes injected; tongue coated. Evening: Temp. 103.2° F.; pulse 96; resp. 24; urine acid, not precipitated by boiling.

3d day. Afternoon: Temp. 100.4° F.; pulse 84; resp. 20; urine acid, gives a distinct precipitate on being heated to the boiling point; tongue coated; face less flushed; thirst; anorexia.

4th day. Afternoon: Temp. 99.8° F.; pulse 66; resp. 22; urine not precipitated by heat nor by NO_5 ; subicteric tint of conjunctivæ; thirst; anorexia.

5th day. Midday: Temp. 99.3° F.; pulse 64; resp. 22; urine turbid, no albumen; appetite returning.

6th day. Afternoon: Temp. 99.8° F.; pulse 64; resp. 22; broth allowed.

7th day. Temp. 99.3° F.; pulse 56; resp. 22; some appetite; conjunctivæ subicteric.

The fact that this person had returned to Havana six days before the attack, together with the long incubation of twenty-two days, leaves a doubt regarding the part that the inoculation may have had in the causation of the disease; but, on the other hand, the small number of yellow fever cases reported at that time in Havana, and the circumstance that newcomers are not often attacked so early as six days after

their arrival in the city, have induced me to include this among my successful inoculations.

From the evidence adduced in the preceding pages, I conclude that while yellow fever is incapable of propagation by its own unaided efforts, it may be artificially communicated by inoculation, and only becomes epidemic when such inoculations can be verified by some external natural agent, such as the mosquito.

The history and etiology of yellow fever exclude from our consideration, as possible agents of transmission, other blood-sucking insects, such as fleas, etc., the habits and geographical distribution of which in no wise agree with the course of that disease: whereas, a careful study of the habits and natural history of the mosquito shows a remarkable agreement with the circumstances that favor or impede the transmission of yellow fever. So far as my information goes, this disease appears incapable of propagation wherever tropical mosquitoes do not or are not likely to exist, ceasing to be epidemic at the same limits of temperature and altitude which are incompatible with the functional activity of those insects; while, on the other hand, it spreads readily wherever they abound. From these considerations, taken in connection with my successful attempts in producing experimental yellow fever by means of the mosquito's sting, it is to be inferred that these insects are the habitual agents of its transmission. It cannot be denied, however, that other such agents may and probably do occasionally occur, but not being endowed with the same facilities for rapid and extensive operation, their influence becomes insignificant as compared with the action of the Cuban culex.

THE LOCAL TREATMENT OF PSEUDO-MEMBRANOUS CROUP: INTUBATION OF THE LARYNX.

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ARMSTRONG, in his quaint old book on *Diseases of Children*, reprinted in 1783, and dedicated to Queen Charlotte of England, states that he was often "shocked and mortified" at his want of success in treating hydrocephalus internus, but had he lived in New York during the last twenty-five years, he would soon have learnt to regard the result of his treatment of hydrocephalus internus with stoical indifference, so much more frequently would his sensitive nature have been "shocked and mortified" by his ill success in treating croup, and yet I believe that by bringing to the notice of the profession the solvent power of trypsin, the safety and efficiency of certain of the stronger alkaline solutions,

used by inhalation, by intubation of the larynx and trachea to relieve the dyspnœa, and by the early performance of tracheotomy where other measures fail to give relief, as much has been done in New York, during the last ten years, to relieve the hapless victims of this disease from impending death and death after extreme suffering, as in any other portion of the world.

Alkaline inhalations have been in common use in the treatment of croup, as far back as the recollection of the oldest physicians extends. This treatment is rational, and is based on the clinical fact that alkalies have a solvent effect on fibrin, of which pseudo-membranes largely consist. The vapor arising from slacking lime, or from boiling lime-water, has been so long used that it is associated in the mind with cases of croup. But water takes up only a small quantity of lime, so that, although the room occupied by the patient be filled with its vapor, but little lime is inhaled. The recommendation of late years to increase the alkalinity and, therefore, the efficiency of lime-water by adding to it an alkali, as sodium bicarbonate, has been successfully carried out in practice.

Another agent recently brought to the notice of the profession as a solvent of pseudo-membrane, is the digestive ferment trypsin. Unlike pepsin, which has likewise been employed for the same purpose, it exerts its solvent action in an alkaline medium. For a knowledge of its efficiency as a solvent of pseudo-membranes, we are indebted to chemists, but the attention of New York physicians was first directed to it by Dr. Van Syckel, of Harlem. It is obtained in the shops, prepared by chemists in the form of a powder, insoluble, or but slightly soluble in water, and it is employed for inhalation held in suspension in the medium used. When asked how to treat a case of membranous or diphtheritic croup before it has reached the stage which requires surgical measures, I know no better method than the constant or almost constant inhalation from the steam atomizer of the following:

R.—Trypsin	q. s.
Sodii bicarbonat.	℥ij.
Aquæ calcis	℥vj.—Misce.

As much trypsin should be added to the alkaline mixture as can be held in suspension without clogging the tubes of the steam atomizer, and it will be found that considerable trypsin may be inhaled in this way in a short time. The only objection to this agent is its expensiveness, so that poor families may sometimes find it difficult to obtain it in sufficient quantity for continuous use during a day or two.

The result in the treatment of croup by inhalation depends to a great extent upon how early it is commenced. In my opinion, croup can not infrequently be prevented by persistent alkaline inhalations employed as soon as the least huskiness of voice is observed. A physician attend-

ing a case of diphtheria should, each day, notice the character of the voice or cry of the child, and if there be the least hoarseness or departure from the normal clearness of its voice or cry, and he recommend the use of alkaline inhalations from the steam atomizer, I believe that the slight laryngeal catarrh which is a forerunner of croup may in a considerable number of instances be removed, and the disease be prevented. I seldom attend a case of diphtheria without observing at each visit the character of the voice, and I frequently make the child cry or cough that I may better learn the condition of the larynx. But if these first slight symptoms pass unheeded, and inhalations be not used at the proper moment, and the pseudo-membrane form upon the laryngo-tracheal surface, we all know how ineffectual inhalations are to check the disease, and save life. Frequently croup occurs at the commencement of diphtheria, and is its earliest and chief manifestation, and the physician is not summoned to the case until the obstruction in the air-passages is fully formed, and the nature of the attack is recognized by the family. Under such circumstances, inhalations will not save life, nor will they do more than perhaps retard in a measure the progress of the disease. One important benefit from inhalation is that it renders the muco-pus thinner and more easily expectorated, the result largely of the watery vapor inhaled, and not entirely of the alkaline solvents employed, although they probably liquefy the thin films of fibrin which are present with the muco-pus.

I must here protest against another mode of treatment, which is designed to act locally, which has been extolled in some of the journals, and which has been practised in this city. I refer to the use of pilocarpine. The theory of those who recommend its employment in diphtheria is that by the abundant secretion from the surface of the air-passages which it causes, it produces detachment of the pseudo-membrane, while it renders the secretion more liquid. But it must be remembered that the expectoration of the bronchial secretion is difficult in membranous croup on account of the obstruction produced by the pseudo-membrane, so that pilocarpine is likely to cause a rapid filling up of the bronchial tubes, an increase of the dyspnœa, and sudden death with symptoms very similar to those produced by suddenly developed œdema of the lungs. I have witnessed this result, the bronchial tubes suddenly filling with the secretion and the patient dying with symptoms of extreme dyspnœa, although a few hours previously he seemed to be in a favorable state.

Much of the success in treating croup by local measures depends upon the apparatus employed. Great assistance has been afforded by the steam atomizer, which without overheating the room, and without the need of a tent to cover the patient and exclude the air, which he so greatly needs, takes the place of the pans and pails and heated bricks

and irons to produce the necessary alkaline vapor, appliances which the older physicians remember that all of us formerly used. The instruments employed in tracheotomy have been so improved, modified, and increased in number since Trousseau brought forward his canula with two concentric tubes, that surgeons possess all that is required to render this operation as far as possible successful. But one of the most important inventions bearing on the local treatment of croup has been recently announced in this city.

The profession of America is indebted to the New York Foundling Asylum, in consequence of the opportunities which this large institution affords, for the differentiation of *rôtheln* from roseola and from measles, and its recognition by us as a distinct disease of a constitutional nature; but a much greater benefit has been conferred by the Asylum, and entirely through the genius and perseverance of Dr. O'Dwyer, in the construction of the laryngeal tubes, and in demonstrating their usefulness in relieving the dyspnœa of croup, in prolonging life, and rescuing from fatal asphyxia a considerable proportion of the cases of croup.

In September, 1858, M. Bouchut, of Paris, read before the Academy of Medicine in that city, a paper entitled "A New Method of Treatment of Croup by Tubage of the Larynx." In this paper the author relates two cases in which he had practised intubation. Both patients were temporarily relieved of the dyspnœa by this operation, but both subsequently died. One lived thirty-six hours with the tube in the larynx, breathing easily during this time, and dying from blood poisoning. The other patient had a return of the dyspnœa some hours after the insertion of the tube, and the house physicians performed tracheotomy without the presence or knowledge of Bouchut, and without disturbing the tube in the larynx, which remained *in situ* forty-eight hours without inconvenience. The tube employed by Bouchut was less than an inch in length, and in the diagram resembles a thimble of small diameter with both ends open. Its upper end when in position lay between the two vocal cords. Bouchut closes his paper with the statement of the following facts, which he believes are established by the above cases. The translation is a free one:

1. The ease with which we can practise tubage of the glottis by means of a canula fastened upon the inferior vocal cords and not hindering the functions of the epiglottis.

2. The tolerance of the canula by the larynx.

3. The possibility of relieving the dyspnœa of croup, and of other diseases of the larynx by this means in preference to tracheotomy.

4. The facility with which large pseudo-membranous concretions formed in the trachea and bronchial tubes are expelled through the intraglottic tube.

5. The utility of this new resource (tubage) for physicians who prac-

tise in small localities without helpers and far from assistance, since little aid is required in introducing the tube.

Unfortunately Bouchut attacked tracheotomy, attempting to show by statistics that the number of deaths from croup is increased by this operation. Trousseau at that time was the great champion of tracheotomy. He had invented his tracheal canula with two concentric cylinders, essentially the same as that in common use. It is natural for one that is struck to strike back, and Trousseau, seeing his pet operation assailed, attacked what he believed to be a new heresy promulgated by Bouchut, with all his power, with statistics, argument, and ridicule. A committee was appointed, with Trousseau at its head, to report on tubage of the larynx for the relief of croup. As might be expected, the committee unqualifiedly condemned tubage and recommended tracheotomy.

The debates which occurred on this subject in the Imperial Academy of Medicine, in which prominent physicians of Paris participated, are interesting at this time. They may be found in the *Gazette des Hôpitaux* for 1858. More than a quarter of a century has elapsed since these debates, and tubage of the larynx had been forgotten as a means of relieving the dyspnœa of croup, until it was revived by Dr. O'Dwyer, although in Bouchut's treatise on *Diseases of Children* one page is devoted to this subject, in which the statistics of seven cases are given, but without a very favorable result.

Intubation of the larynx, as practised by Dr. O'Dwyer, was original with him. He had invented the tubes, and he had performed the operation many times in the New York Foundling Asylum, when his attention was called by the writer to the work of Bouchut in the same direction, and it is only recently that he has seen the report of the memorable debates in the French Academy. He had been four or five years modifying and improving the instruments employed, availing himself of the ample opportunities which the Foundling Asylum afforded for observing the effects of intubation, before this mode of treating croup was announced in the medical press. The tubes of O'Dwyer differ very much from those of Bouchut, and O'Dwyer's last tubes differ very much from those first employed, so many are the alterations he has made in them during the last five years.

Intubation of the larynx has been performed so many times according to O'Dwyer's method, and his tubes, which extend the whole length of the larynx and trachea to within half an inch of the bifurcation, have been so much improved, that there can be little doubt that this operation will not meet the fate which awaited it when performed and recommended by Bouchut. On the other hand, intubation is destined, I think, to be employed more generally than tracheotomy, both in this country and in Europe, since it is so much more simple. The following facts may be considered established by the statistics of intubation, the

number of cases in which it has been performed for the relief of croup being now quite large :

1st. The tube can be inserted in the fractional part of a minute, and it can be removed in less than a minute. The operation causes little or no pain, and it requires only the assistance of a competent nurse to hold the child and steady its head. Contrast the simplicity of this operation with tracheotomy, which M. Sanné says should not be undertaken without the help of three intelligent and efficient assistants, at least one of whom should be a physician.

2d. In all cases in which the obstruction is limited to the larynx and trachea, intubation relieves the dyspnœa as quickly, effectually, and permanently as does tracheotomy.

3d. When inhalations and the proper medicinal treatment do not relieve croup, and dyspnœa begins, intubation is required. This will, in most instances, give complete relief for a time. If the respiration subsequently become embarrassed, and no benefit occur from cleaning the tube, tracheotomy may be required. Intubation may properly precede tracheotomy in most cases.

4th. Physicians have long known that the mortality from croup might be considerably diminished by the early performance of tracheotomy, and much suffering be prevented, but most parents will not consent to the performance of so severe an operation till the dyspnœa becomes extreme, and measures designed to give relief are urgently required. Not a few parents, in the middle and lower classes, allow their children to die rather than consent to this operation. On the other hand, few parents, I think, will object to intubation, and when they see the relief which it produces they will probably consent more readily to tracheotomy if the dyspnœa should return. If only one of these operations be performed, statistics thus far show nearly as good a result from intubation as from tracheotomy. In the New York Foundling Asylum, during the last year, intubation has been performed in twenty-five cases of membranous croup, with six recoveries. This institution has charge of about 2000 children, three-fourths of whom are "farmed out" in families in the city, and when they contract serious disease they are returned to the Asylum. With such a class of patients it must, I think, be admitted that a better result would not have occurred from tracheotomy.

5th. Now that diphtheria has become so common in this country, and epidemics of it occur in villages and country towns, with, probably, as large a proportion of cases of croup as in the cities, it seems to me, with Bouchut, that the country physician should be provided with the necessary instruments for intubation whenever diphtheria appears in his locality. Alkaline and trypsin inhalations, properly and almost constantly used, and intubation performed early, when the patient begins to suffer from dyspnœa, would probably prevent the necessity of tracheotomy in a

large proportion of instances. But if such treatment do not fully relieve the dypnœa, it will, I think, in most instances, so diminish it and retard the progress of croup, that the physician, remote from help and unfavorably situated for the performance of tracheotomy, will have ample time to prepare for this operation. We repeat, that intubation may prevent the need of tracheotomy, but if it do not, it presents no hindrance to it. We have stated above that in one of Bouchut's cases the house staff, alarmed by the dyspnœa of a patient who was carrying the laryngeal tube, which had probably become obstructed, performed tracheotomy without disturbing the tube. The longer tube of O'Dwyer might, perhaps, serve as a guide in tracheotomy, but it can be quickly removed, if thought best, before the operation is commenced.

ABNORMAL VISUAL SENSATIONS.

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WITH increasing knowledge and improved methods of diagnosis, most of the cases formerly classed as amaurosis or amblyopia are now relegated to their proper position in the list of more definite diseases of the eye; but meanwhile slight errors of vision, which were formerly unheeded, have been brought into notice, some of them only within the last year or two. Amblyopia thus continues to be a generic term, including all cases of dull sight in which no distinct lesion of the eye can be discovered; it expresses, in a general way, the failure in function without indicating the pathological condition present. Subdivisions have been made according to the assumed cause of the affection; the assumption in some cases is supported by the strongest possible evidence, as in tobacco amblyopia; while, as more light is thrown upon the subject, the term hysterical amblyopia becomes less frequently used.

The essential symptom is a partial or complete absence of perception, either of objects or colors, in some part of the visual field; the function is impaired or modified. A normal visual acuity varies with illumination; it is certain, therefore, that some amblyopias will be much modified by the amount of light.

It is convenient to classify the cases according to the part of the visual field which is chiefly affected; but at the same time the evidence that has been derived from the pathological conditions present in those examined indicates that the position of the lesion is fairly constant for similar conditions of the visual field. In some a well-defined organic mischief

has been shown to be present, either in the peripheral nerve terminating in the retina, in the cerebral centres, or in the optic fibres connecting these; in others a definite cause exists for initial vascular disturbance of the nervous elements of the retina.

The main affection of the visual field may be at the periphery, at the centre, or in one half: "concentric amblyopia," "central amblyopia," "hemiotopia."

1. *Concentric limitation of the field of vision* exists whenever the general function of the retina is impaired; for instance, after "injury;" in "retinitis pigmentosa," where the effect of dull light is very marked (other forms of retinitis are complicated by hemorrhage); and in increased "eyeball tension."

In "reflex amblyopia" (Priestley Smith, *Ophthalm. Rev.*, 1884), where some distinct irritation of sensory nerves affects the retinal circulation, it is the circumference of the field that is most blurred in many cases. The removal of the uterine appendages by abdominal section effected the recovery of useful sight in an eye which, up to the very day of operation, was increasingly threatened with blindness; the withdrawal of a tooth is said to have restored sight to an eye formerly blind; and a similar cure has followed free purgation. The retinal fatigue which accompanies general nervous weakness ("neurasthenic asthenopia," Wilbrand), whether expressed by anæsthesia or hyperæsthesia, is best marked at the limits of the field, as is the case also with "hysterical amblyopia," which is almost always either neurasthenic or reflex.

The concentric limitation of the field depends on functional weakness of the periphery of the retina, due to failure in its circulation; no definite abnormal appearance of the fundus oculi can be seen, although hyperæmia or slight œdema may have been described. Marked retinal asthenopia may be present without any appreciable alteration in the disk or in the retinal bloodvessels; but it must be remembered that the rods and cones derive their blood from the "chorio-capillaris," whilst the "arteria centralis retinæ" supplies the less vital fibres and large cells. Moreover, the chorio-capillaris which lies upon the hexagonal pigment cells has its network closest and richest for blood supply at the yellow spot, whilst it becomes gradually more open toward the ora serrata. The anterior parts of the outer more active retinal layers would thus be earliest affected by any conditions producing vascular depression.

Concentric amblyopia depends probably, therefore, upon malnutrition of the bacillary layers of the retina by failure of the circulation in the chorio-capillaris.

The circulation in each eye is separate entirely from that of its fellow; each has its own special sympathetic control. The importance of the circulation through the arteria centralis retinæ must not be underrated, for its blockage is followed by complete blindness in the affected eye,

while occlusion of one of its branches destroys the function of that segment of the retina to which it is supplied.

2. *Hemiopia* in one eye may thus result, the line of separation being usually horizontal. Interstitial inflammation of a part of one optic nerve may cause a like segmental defect. A medical friend has complete scotoma in the lower field of the left eye; the central vision presbyopic is J. 16 and $\frac{20}{XLV}$ compared to $\frac{20}{XXXV}$ and J. 16 in right; no retinal abnormality can be detected by the ophthalmoscope; the retinal blood-vessels are everywhere normal; but the whole optic disk is distinctly white.

Hemiopia is usually binocular, and depends on intracranial lesion, and conversely intracranial mischief of the optic tract or centres produces binocular hemiopia; for, by reason of the symmetrical binocular arrangement of the nerve system of the eyes, *each side of the brain is represented on that same side in both eyes*. A right cerebral lesion causes impairment of the right half of each retina, with amblyopia in the left field. Samuelsohn has described a case of binocular hemiachromatopsia, the other eye symptoms being normal, in a patient with hemiplegia from apoplexy; Swanzy a somewhat similar case. Conversely, *each eye is represented in both sides of the brain*. In hemiopia, central vision is frequently normal; each macula is supplied by both optic tracts. This anatomical arrangement may explain cases of monocular diplopia; in most of those recorded, cerebral lesions have been found after death. Dr. Abercrombie has suggested that the impressions transmitted from the single retina to its two sides in the brain are interfered with by the presence of the lesion; and the two hemispheres not acting in perfect unison, a concept is created of two separate impressions. Where monocular homonymous diplopia has followed after ordinary binocular homonymous diplopia from paralysis of an external rectus, Nettleship thinks that the diplopia of each separate eye may be a mental reproduction of the diplopia experienced by the distorted pair. When both eyes are affected with monocular diplopia, there is usually a great similarity in the relative position of the images as seen by each separate eye. Sometimes the position of the images is such as to suggest an absolutely symmetrical affection of the retina in each eye. Monocular diplopia may affect one eye only, or may exist in only the outer field of one eye (Brailey). A converse condition of things has lately been described by Wolffberg, viz., a blending of two separate but similar objects lying close together into one image, whether looked at with the two eyes or with one singly. The position of the lost image was not recognized as a defect in the visual field. The pathological cause of this illusion is not suggested; possibly some of the retinal nerve endings are not properly represented in the higher visual centres.

3. While hemiopia depends usually upon some disease on the cerebral side of the optic chiasma, central amblyopia may be generally associated with a lesion in the optic nerve or in its retinal expansion. A well-marked central scotoma may be present, or only a very slight error of the color sense. The detection of the slighter defects depends on the care and capacity of the observer; and, while one may explain the symptom by describing a diffused grayness, an cedema, or small white specks in the macula, another may entirely fail to find anything wrong. Tiny hemorrhages may be overlooked. When they exist at the papilla, they are suggestive of a similar condition deeper in the nerve. In typical cases it is admitted that ophthalmological evidence of changes in the fundus are absent. In many a toxic causation is fairly assumed. Tobacco, alcohol, bisulphide of carbon, lead, quinine, have all been admitted as causes, in addition to kidney disease and diabetes.

I have under treatment a man of forty, with typical tobacco amblyopia, who has been a teetotaller for twenty years. Most excessive smokers also drink, perhaps not to excess. The efficacy of alcohol in preventing tobacco blindness may be questioned, but it is easier to induce the patient to abandon tobacco if a little stimulant is still permitted. I have seen one or two cases of dull central green perception in women which I have attributed to alcohol. A gentleman of forty, who had suffered from albuminuria for some years, but without any other evidence of disease, consulted me for failure of sight. Central vision was reduced one-half; there was a well-marked red scotoma and a total absence of green perception under several tests. The fundus of the eye showed no albuminuric signs; nothing but some pallor of the disk. The patient smoked and drank liberally, but not to great excess; at the same time he slept badly and ate little. Reduction of both smoke and drink soon markedly improved his condition, but I do not know whether the eyesight has recovered.

Post-mortem examination of patients who had central amblyopia has shown that a neuritis with marked interstitial inflammatory changes existed in the axial fibres of the optic nerve. In some of them the brain lesion lay opposite the optic foramen, where the nerve is constantly subjected to pressure against the bone and by the ophthalmic artery. The bloodvessels of the nerve, quite distinct from the retinal and choroidal arteries, pass in at the surface of the nerve and become more and more divided as they approach its central fibres. The finest capillary plexuses which have the highest functional activity, and are therefore specially prone to inflammation and pathological changes, are distributed to the central axial fibres which are the most highly vital, and pass into the macula lutea. Thus the part of the optic nerve which is concerned in central vision is specially liable to hyperplasia and sclerosis.

Central scotoma is well known as a result of gazing at the sun; in

extreme cases the ophthalmoscope may show a small white spot at the centre of the macula, surrounded by a red ring. Near exposure of the eye to a strong electric light produces impairment of the retina, followed in a few hours by inflammation of the eyes; snow blindness is accompanied by similar symptoms. Excessive stimulation of the retina is more diffuse, in the latter cases implicating the whole membrane; in the first the macula is mainly affected.

Well-defined structural changes have been found in the eyes of rabbits which have been exposed to excessive sunlight; microscopic examination showed disorganization of a limited area of the retina by coagulation of its albumen, and beneath and around this hyperæmia and exudation in the choroid. The ophthalmoscopic appearances in man are such as might be dependent on the like histological changes in the macula. Inflammation of the yellow spot with swelling and separation of the retinal elements may be a cause of micropsia; a diminished number of the cones, and these the more central, are overshadowed by the retinal image, and the contracted area of the stimulation produces a relatively limited mental impression. Diminution in the apparent size of an object has been also explained by Bensen in a case of ophthalmoplegia interna, as dependent upon the extra muscular strain needed by a weakened ciliaris, this giving an idea of undue approximation of the object, and so of its relative diminution in size.

Metamorphopsia probably results from an altered relation of the macular elements. Straight lines seem bent and crooked; part of an object is too small, part too large (megalopsia); separate objects in the visual field may be perfect, but their relations to one another contorted and untrue. The letters of a word may be seen in front of and some behind the level of the paper on which they are printed.

In these complicated visual errors it is impossible to say what part the mind plays, or how much they are dependent upon the condition of the eye.

Visual hallucinations, properly so-called, which are purely dreams of the imagination, dependent on abnormal conditions of the highest physiological cerebral centres, subjective in themselves, and not dependent upon stimulation or alteration of their afferent nerve tracts, are probably extremely rare during hours of wakefulness. Such a case is described in the appendix to *Huxley's Physiology*. The dreams of sleep usually are excited by some external stimulus. An illusion or modified sensation may depend upon exhaustion or mischief in the central organ, or may arise from perversion of the stimulus received upon a faulty peripheral sense organ.

The brain is affected in such a case as that of the Hon. Mr. Perceval, who mentions that, on the commencement of his insanity, while looking at a boiled fowl which was prepared for his dinner, it appeared very

large and plump, then it suddenly became small and meagre, and afterward of twice its former size. So, in watching a fellow patient, who was one day walking in the airing ground, he observed at one part of the walk that this man suddenly changed in shape, and walked into the house under the form of a demon. The illusion from the same object is, therefore, not always fixed and permanent, but subject to momentary changes.

Two cases have come under my observation in which seeing imaginary faces in the day has been associated with retinal disease, and it is possible that in them the diseased sense organ may be largely answerable for the illusory appearances.

CASE I.—Miss M., aged fifty-five, consulted me for asthenopia: “objects seem strange and distorted, faces are looking at me on opening my eyes after having closed them for relief or sleep.” She had always been short-sighted. Had a slight seizure three years before of both hands, with transient difficulty in choice of words. For two years both eyes had regularly seen a blaze of gold light on the street lamps surrounded by halos of green, red, and purple. Sight had been dull also, the electric light not seeming to her specially bright.

Vision of left eye $\frac{5}{xxx}$ J. 8. Fundus apparently healthy as seen through cataractous lens. The right eye was also cataractous, but the fundus could be indistinctly seen. The nerve seemed normal, its vessels were of fair size, it was pale, tending to be cupped, and surrounded by a narrow posterior staphyloma. There was a distinct patch of thin retinitis at the macula, with fine specks of pigment on the retinal vessels. There were also one or two floating specks in the vitreous. Tension was normal, and no indications bore examination in favor of glaucoma.

The right eye was alone affected by seeing—upon opening and closing—faces looking at her of squirrels, owls, and less clearly of men, never two alike, and never suggesting known characters. This symptom had existed for some months, and disappeared during sleep and with closed right eye. She described metamorphopsia, but it was absent at my examination.

CASE II.—Mrs. S., aged seventy, complained of scintillations of light, and of having seen more or less constantly for several months large faces on the wall. The faces were generally in profile, bearing some resemblance to one another, rarely to be recognized, but occasionally suggestive of some known person. The faces were present at all times of the day when her eyes turned toward the wall. Vision was reduced to barely J. 20 by large patches of choroido-retinitis with atrophy, the disks were pale, and the vessels small. The media were perfectly healthy. Despite the failure of vision Mrs. S. wrote quite legibly. There was nothing in the past history throwing light upon the case. Both these ladies were sensible, and used every suggestion given to rid them of the illusion, but I obtained no satisfactory result from a short course of treatment in either case.

An interesting series of symptoms in fatigue of the visual nervous system is reported by Richard Hilbert (*Klin. Monats. f. Augenheilk.*, 1884):

"(1) After a sleepless night H. found that, on looking at a white surface, the field of vision was subject to alternate flashes of light and obscurations synchronous with the pulse beat. (2) On looking at print the letters seemed some in front and some behind the paper; paving stones appeared on a different level in the street. (3) The interspaces between the paving stones appeared red. This condition of *erythroptisia* occurred with various degrees and directions of light; it was present with one or both eyes open, with closed eyes it was never perceptible."

The symptoms were considered due to general nervous exhaustion, with hyperæsthesia of the visual nervous system in the brain; and reasons are adduced for preferring this central hypothesis in erythroptisia, rather than explaining it by retinal fatigue; but the latter cause seems at least equally probable. No abnormal condition of the eyes could be detected during the attack; with the exception of slight myopia, they were objectively normal.

Chromophobia is a term applied to cases of special hyperæsthesia in which some particular color causes intense worry to the patient, who may, for instance, be made miserable by seeing a piece of red blotting-paper.

Whatever may be the relative bearing of the peripheral sense organ, or of the central sense organ, in a given case of impairment or illusion of vision, the optic nerve itself when stimulated merely gives rise to a sensation of light. Sensations of light are well known to be excited independently of ordinary impressions from external luminous objects; some are altogether the result of disease in the optic apparatus. The word *photopsia* best expresses this subjective feeling of "visus lucidus."

CASE III.—A lady, aged forty-six consulted me on account of most severe attacks of light *glare*. The left eye had been removed twelve years before for recurrent attacks of inflammatory glaucoma. The right eye then began to give trouble; an iridectomy was done eight years ago with a good result; a second operation was required two years later; and a year after this very little vision remained. The "glares" first began in April, 1885; they have continued to cause her the greatest worry and inconvenience on every other day, almost without intermission up to the present time. In July, 1885, there was perception of candle light. The patient says that she feels in the morning that the glare is coming on; about noon a sheet of light gradually spreads in front of her as if the outer world had become bright, and continues with little variation in intensity all day; if she falls asleep, as she often does, the attack is gone on waking, but it gradually reaches its former intensity. It usually gets rather worse toward dusk, and she wonders why people want lamps. The attacks recur every second day, the sight then seems very bright in contrast with other days when it seems dull; no objects are ever seen, but slight dazzlings occur, with green, red, and purple colors.

When I saw her first in April, 1886, I found the right eye shrunken, with much diminished tension, and subacute hyperæmia of the tunics. The cornea, entirely replaced, except at the periphery, by a thick sclerosis in which the iris seemed implicated, was flattened, and no anterior chamber existed. Perception of light was entirely gone. The glare was dis-

tinctly referred to this eye, which became weak and red during the attack. She has led an active life, but for years has been liable to attacks of slight weakness of the left side, lasting only a few minutes, which are induced by slight sudden shocks. Her heart was easily upset. There had never been any indication of migraine, no frontal headache, hemicrania, nausea, or sickness, nor were there any special symptoms before or after the attacks of "eye-glare." These had first commenced long after the age usual for migraine, in which also the scintillating scotoma usually lasts for only an hour or so. The hemiplegic attacks mentioned had been definitely called hysterical; the patient was certainly hyperæsthetic. There was no definite pain in the eye.

The continuous character of the glare is more in accordance with a continuous irritation of the optic nerve producing a condition at the cerebral cortex which culminated in the mental impression complained of, than that it was primarily due to blood changes in the central organ, or nerve discharges from it, which would cause more inconstant and transient light seizures.

Charpentier (*Archives d'Ophthalmologie*) remarks, as the result of experiments, that the sensation of light is produced by the excitation of other elements than those set in action when distinct vision or the sensation of color is elicited.

The light sense is pretty equally distributed throughout the visual field, and possibly depends on the evenly arranged hexagonal pigment cells.

In the case mentioned, the glare had commenced about the time the eye was distinctly degenerating, and also when the patient (who at this time had only bare knowledge of the position of light) was becoming hopeless as to return of sight.

The "longing to see" might have influenced her over-sensitive brain to be unduly active to the subjective impressions received from the hexagonal cells, or whatever may be the physical basis for the light sense, within her irritated and disorganizing eyeball.

Under treatment directed to the patient's general health, improvement is beginning to be felt, but the "glare" still comes on every second day, although in distinctly less amount, sometimes scarcely at all, as I gather from letters. I attribute the photopsia to the condition of the eye, because the eye is always more hyperæmic and damp during the attack; it only then feels distinctly "weak" to the patient—she herself refers the conditions solely to the eye; and lastly because cocaine has given such marked relief that she always keeps it close to her on "glare days" so as frequently to apply it.

The misery caused by the glare was such that, had no improvement followed general treatment, the patient would have submitted to removal of her only eye if she could have been reasonably assured that this would give a fair prospect of relief.

THE SURGERY OF THE PANCREAS, AS BASED UPON EXPERIMENTS AND CLINICAL RESEARCHES.¹

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(Continued from page 165.)

WOUNDS OF THE PANCREAS.

OF all abdominal organs the pancreas is most exempt from injury, both from direct and indirect violence, a circumstance which is entirely due to its remote location, and the ample protection furnished by the vertebral column and the bony walls of the chest. The anatomical relations of the pancreas to numerous and important organs are such that when this organ is injured the same violence which has produced the injury has also wounded an adjacent and perhaps more important viscus. The frequency with which such grave complications attend wounds of the pancreas, and the profuse hemorrhage which usually attends such injury, are elements of danger which impart to wounds of the pancreas more than an ordinary degree of gravity.

Contusion.

CASE I.—Cooper (*Lancet*, Dec. 31, 1839, vol. i. p. 486) reports the case of a man, aged thirty-three years, run over by a light cart, moving with great speed. No marks of external injury were visible, but the lower left ribs were fractured, and the pancreas was literally smashed, and embedded in semi-coagulated blood. The spleen and left kidney were also ruptured. He died a few days after the accident.

CASE II.—Travers (*Lancet*, 1827, vol. xii. p. 384) observed a case of laceration of the pancreas at St. Thomas's Hospital. An intoxicated woman was knocked down by the wheel of a stage-coach, which, however, did not pass over her. She lived only a few hours. Several ribs were fractured; the pancreas was found completely torn through transversely, the liver was lacerated, and much blood was effused.

CASE III.—Störck (*Annus Medicus*, 1836, p. 244) mentions the case of a woman who was run over by a coach, and who died within a few hours. The pancreas was found completely torn in two, and embedded in a large mass of semifluid blood. Several ribs were fractured, and the liver was also ruptured.

CASE IV.—M. Le Gros Clark (*Lect. on Princ. Surg. Diag.*, 1870, p. 298) observed an instance of subcutaneous laceration of the pancreas, which occurred in a lad who was also the subject of other severe injuries that speedily proved fatal.

Penetrating Wound of Abdomen, with Protrusion of Pancreas.

CASE V.—Laborderie (*Gazette des Hôpitaux*, 1856, No. 2) reports the case of a girl, aged ten years, who had fallen, while running, upon an open pocket-knife, which inflicted a wound two centimetres below the lower border of the

¹ Read before the American Surgical Association, Washington, D. C., April 29, 1886.

rib, and three fingers' breadth to the right of the median line, extending outward for one and a half centimetres, almost horizontal, with a little inclination from above downward. The pancreas was found strangulated in the wound so tightly that not a drop of blood escaped. The author believed that the prolapse was caused by the screaming of the patient. The duct of Wirsung and vessels escaped injury. The abdomen was painless on palpation, and there were no signs of internal hemorrhage. The knife had entered the abdomen under the lobus Spigelii of the liver, and in its course reached the stomach, cut through the gastrohepatic omentum, and then penetrated between the liver and pylorus to the pancreas, without injuring any of the many large vessels in the locality through which it passed. An attempt to replace the gland was only partially successful. The mass was transfixed and tied at its base with a double ligature, and the portion outside of the ligature removed with the knife. After this procedure nausea and vomiting set in, which, however, soon subsided. The wound was treated by the use of cold water applications. On the third day the patient complained of being chilly, and the abdomen became somewhat tympanitic and tender on pressure. These symptoms soon subsided, and the ligatures sloughed through, leaving a granulating surface, which healed in fourteen days. Recovery was complete in three weeks.

Hyrtl and Klebs are incredulous as to the prolapse of the pancreas in this case; they believe that the mass which was ligated and removed was not the gland, but a portion of the omentum. Nussbaum (*Die Verletzungen des Unterleibes*, 1880), however, in speaking of visceral injuries of the pancreas, states distinctly that in penetrating wounds of the abdomen in the region of the pancreas, this organ manifests a tendency to prolapse, and that this circumstance facilitates the treatment, as it protects the peritoneal cavity against infection by plugging the wound, and at the same time affords better access to the bleeding vessels.

CASE VI.—Dargau (*Medical and Surgical Reporter*, Aug. 22, 1874) saw a case in which the pancreas protruded through a wound five inches in length, between the last two false ribs, on the left side. The patient was a negro, who had been injured fourteen hours before he came under treatment. The pancreas was replaced, the wound closed, and the patient made a good recovery.

CASE VII.—Caldwell (*Transylvania Journal of Medicine*, 1828, vol. i. p. 116) reports the following remarkable case. In 1816, a negro was stabbed in the left side, and "an oblong body, between three and four inches in length, was observed to have protruded." Drs. Roberts, Heard, and Caldwell supposed the protruded part might be mesentery, omentum, or lung substance; but, on a more minute examination, that opinion was changed to the belief that it was the small extremity of the pancreas. The protruding part was in a gangrenous condition, and was removed with the knife. The patient soon recovered. The gentlemen who treated the case, "thinking it almost impossible that the pancreas could escape through a part of the diaphragm and between the ribs," made a critical examination of the part removed, which resulted in their *thorough conviction* that the tissue removed was a portion of the pancreas.

CASE VIII.—Kleberg, who, together with Dr. Wagner, Jr., examined the specimen of pancreas microscopically at the time, reports in *Langenbeck's Archiv für Chirurgie*, vol. ix. p. 523, the following case:

A. S., æt. sixty, a discharged soldier, of powerful frame, and a drinker, was surprised while burglarizing, and cut in the abdomen with a knife from below upward while stooping over. He was carried into the surgical wards of the hospital at 6 A. M., having a cut in the abdomen running horizontally between the navel and lower border of the ribs on the right side. Protruding from the wound was a brown-red body about three inches long by two inches in width, of a doughy consistence and covered by a smooth membrane. Imme-

diately after entering the hospital he had a normal passage through the bowels; pulse 72; no pain. The stomach, intestines, and liver could be excluded on examining the appearance and physical properties of the projecting body. There was no fat, as would have been the case had it been the omentum of such a corpulent person. The prolapsed body was compact and homogeneous, could not be separated into layers, and presented no dilated vessels. It was, therefore, taken to be the head of the pancreas.

As reposition of the protruding part did not appear advisable on account of a possible constriction, and as the consequences could not be foreseen, the part was fixed in the wound with two Karlsbad needles, which were passed through the sides of the wound and the protruding part; a silk ligature was then passed around the pedicle of the protruding part and the end cut off with one stroke of the knife; the profuse oozing of blood was stopped by tightening the ligature. The stump was touched with liq. ferri sesquichlor., and cold applications made over the whole abdomen. There was no fever, peritonitis, or disturbance of digestion in the course of the recovery. The needles and sutures were removed on the fourth day; the stump had become adherent to the edges of the wound. The stump and ligature came away on the tenth day. The patient left the hospital twenty days after admission, with a three-cornered depressed scar. As he was perfectly well nourished during the entire time, it is probable that the caudal extremity of the gland was removed and that the portion of the gland remaining, with the excretory duct, performed the function of the gland adequately.

The following two cases are from the *Medical and Surgical History of the War of the Rebellion*, Part II. Vol. II., Surgical History, p. 158.

CASE IX.—Assistant Surgeon J. G. Thompson, 77th New York, reports the case of "a soldier, name unknown, who was wounded at Cedar Creek, October 19, 1864. The ball entered the right side, below the ribs, and emerged on the left side. He was removed to the Taylor Hospital, at Winchester. While straining at stool, two days subsequently, a hernia of the pancreas occurred of the size of a hen's egg. A silver wire was passed about the pedicle by which it was attached, and twisted tighter each day for about a week, until it became very small, and was snipped off with scissors. No especial symptoms supervened, and by the last of November the patient was in a fair way toward recovery and was moving about the hospital. In December he was still doing well."

CASE X.—Private William Freshwater, Co. F., 66th Ohio, received wounds of the abdomen, left forearm, and neck, at Port Republic, June 9, 1862. He was conveyed to Front Royal, arriving on the 13th, and on the 14th was sent by rail to Washington, and admitted, on the 15th, to Judiciary Square Hospital. He was placed in a ward under the charge of Acting Surgeon D. W. Cheever, who states that "a ball had entered one and a half inches outside the left nipple, on a level with the seventh rib, and could be felt under the skin near the spinous process of the left dorsal vertebra. Some viscus, thought to be the lower tip of the lung, protruded at the wound. He died in two days (June 17th) with symptoms of peritonitis. Post-mortem: The ball had pierced the diaphragm without touching the lower lobe of the lung; there was no perforation of the intestines, but they were glued together by peritoneal inflammation. The pancreas protruded at the wound."

Gunshot Wounds.

The only cases of gunshot wounds of the pancreas that I have been able to find are reported by Otis (*Ibid.*, p. 159).

CASE XI.—Private J. Koprieau, Co. B., 51st New York, aged thirty-two years, was severely wounded at the battle of the Wilderness, May 5, 1864, and was at once taken to the field hospital of the 2d division, Ninth Corps. As the patient could not talk English, the history of the case is quite imperfect.

Assistant Surgeon J. C. McKer furnished the following description, which I have abbreviated without omitting essential facts. The patient came under his care May 25, 1864, when it was ascertained that he was suffering from a gunshot wound of the back, the ball entering about six inches to the left of the spinal column, having pushed below the eighth or ninth rib. It was evident that the ball had entered the abdominal cavity, but its course could not be ascertained. Patient's general health was apparently good, and he seemed to suffer but little pain from the injury. Appetite good, bowels regular, urine slightly suppressed and somewhat highly colored. Pulse normally full, but slightly irritable. The patient was ordered quinine, whiskey, nourishing diet, and two doses of acetate of potassa. No noticeable change appeared for about one week, when a severe hemorrhage occurred, apparently venous, from the external wound, which was soon arrested by the use of compresses and styptics. About six hours afterward a quantity of urine was voided, which was thickly mixed with blood. These hemorrhages continued to recur two, three, and four times daily till death, the urinal discharge being very frequent, and always bloody. Death resulted June 5, 1864. Post-mortem examination revealed the following: A Minie-ball had entered at the middle portion of the eighth rib, fracturing the same, passed through the centre of the spleen toward the pancreas, penetrating this also in a nearly transverse direction, and (probably a few days before death) sinking toward the splenic artery, tore it, and lodged at its origin from the celiac axis; the lung was found emphysematous. The ball was found embedded in the pancreas in a pouch between the sloughing artery and vein. The specimen is preserved as a wet preparation in the Army Medical Museum, and is marked No. 2430.

CASE XII.—Corporal A. B. Jones, Co. D., 5th Vermont, aged twenty-seven years, was wounded at the battle of the Wilderness, May 10, 1864, and laid on the battlefield one day and night; was then removed to the field hospital, from there carried by boat to Washington and jolted over a rough road of two miles to the Lincoln Hospital, which he reached about two o'clock in the morning of the 25th. Was seen a few hours afterward by Acting Assistant Surgeon, T. L. Leavitt, who found him suffering great agony. On examination it was found that the ball had entered one line to the left and below the ensiform cartilage, passing through the abdominal cavity and making its appearance under the skin just above the crest of the ilium posteriorly, where it was excised at the field hospital. Pulse quick and exceedingly feeble, abdomen distended and tympanitic. Opium was administered and the patient took liquid food freely. About noon of the same day the symptoms improved, wound suppurating nicely. About four o'clock was conversing with nurse, apparently in good spirits, without very great pain; in about five minutes afterward was *in articulo mortis*. The autopsy showed the ball to have perforated the inferior curvature of the stomach, and, strange as it may seem, although an orifice was made directly through the walls of the stomach large enough readily to admit two fingers, no inflammation or even congestion could be detected, except in the immediate locality of the wound, which was beginning to suppurate. Evidently the stomach was also uninjured in its functional capacity, as was witnessed by the reception and digestion of food during life. Some branches of the gastric artery were severed, and about an ounce and a half of dark uncoagulated blood filled the pelvic cavity. The pancreas was perforated at about its middle, but, except in the immediate track of the ball, gave evidence of no departure from its healthy standard; the intestine and colon were pushed aside during the passage of the ball and were uninjured; the omentum was found in a state of partial decomposition and closely adhered to the small intestine. Liver and spleen healthy. General peritonitis had prevailed and was undoubtedly the cause of death. In this case life was sustained for a period of fifteen days, notwithstanding the serious injury of a vital organ and the exposure to the most unfavorable circumstances and depressing influences.

CASE XIII.—Private William P. B., Co. A., 44th Georgia, was wounded, near Fort Stevens, in General Early's demonstration on Washington, July 12, 1864, by a cylindrico-conical musket-ball, which entered below the spine of

the left scapula, an inch from the shoulder-joint, and penetrated the chest. He remained a prisoner on the field, and was conveyed to Lincoln Hospital, a few miles distant, being admitted on July 14th. He was examined by Dr. Leavitt, who found that emphysema extended over the entire left chest, that respiration was painful, but not otherwise difficult, and that there was paralysis of motion of the left arm. There was little change in the progress of the case until the 18th, when the pain in the side became severe, and was somewhat relieved by sinapisms. Following day, dullness over posterior left chest, also extreme dullness in the præcordial region and the heart was forced over to the right side. There was dullness too at the base of the right lung, with indistinct respiratory murmur. On the 20th, jaundice was very pronounced. On the 21st, profuse hemorrhage from the nose and mouth occurred, bleeding coming apparently from the lung. Pulse at this time very weak and thready; jaundice extreme. On the 22d there was much pain in the left side, dyspnoea, consciousness perfect, pulse failing; death at noon, July 24, 1864, twelve days after the injury. At the autopsy the wound was traced from the entrance in the scapula through the fractured fifth rib, the track passing downward, inward, and backward, through the lower lobe of the left lung, the diaphragm, the left lobe of the liver to the head of the pancreas, where the ball was found lodged at the angle formed by the coeliac axis with the aorta. The lower lobe of the right lung was hepatized; the left lung carnified, collapsed, and compressed by a large accumulation of black fluid blood. The pancreas was rather large—seven inches long; weight, with ball, five ounces. There was nothing abnormal in its appearance, except the presence of the foreign body. On examining the pancreas microscopically no deviation from the normal structure was found in sections made from the tissue taken from the left end or tail of the viscus and from the middle part. In close contiguity to the ball is a fine network of fibrillated tissue. As hardened in alcohol the specimen offers no indications of vascular engorgement having existed. The specimen is preserved in the Army Medical Museum, and is marked No. 2884.

REMARKS.—Not in a single instance of the thirteen cases of injury of the pancreas, as reported above, did symptoms during life first point to this organ as the seat of lesion. In all cases where the result was fatal, death was not attributable to the visceral lesion of the pancreas, but was always referable to injury of some adjacent organ. With the exception of cases of prolapse of this organ through a penetrating wound of the abdomen, the diagnosis and treatment of injuries of the pancreas will come under the observation of surgeons only in an incidental manner in the treatment of more tangible and graver lesions within the abdominal cavity. Contusion and laceration of the pancreas as an independent condition is not necessarily a fatal injury, and spontaneous recovery may take place followed by absorption of the crushed portion of the organ, and atrophy of that portion of the gland which has become physiologically detached from the intestinal tract by the injury or its direct consequences. Crushing of the pancreas is usually not attended by hemorrhage, and in laceration of the organ the danger from this source is much less than in cases of incised wounds.

As modern surgery dictates not only the justifiability but the absolute necessity of treating penetrating wounds of the abdomen, where visceral injury is suspected, by abdominal section, the surgery of the future will undoubtedly deal with contusions and lacerations of the pancreas in con-

nection with visceral injury of some of its adjacent organs. If, in exploring for injuries in this region, the pancreas should be found extensively crushed, it would be good surgery to remove the crushed portion after preliminary ligation of the organ on each side of the comminuted portion. Ligation of the pancreas can be safely done with a single catgut or silk ligature, as the friable texture of the organ will permit of burying the ligature deeply, a circumstance which will guard against slipping of the ligature. In not a single instance where this method of ligation was resorted to in the experiments on animals, was secondary hemorrhage observed from inefficiency of the ligature. If the pancreas is lacerated, each end of the organ should be ligated for the purpose of arresting or preventing hemorrhage, as well as to guard against extravasation of pancreatic juice into the abdominal cavity.

The results obtained by experiments on animals, as detailed before, have demonstrated in a satisfactory manner that normal pancreatic juice when brought in contact with the peritoneum does not produce inflammation, but is promptly removed by absorption. In the experimental work we always had the advantage of dealing with a normal serous surface, the absorption capacity of which had not been impaired by antecedent pathological conditions, as would in all probability be the case in the operative treatment of injuries of the pancreas. At the same time there can be no doubt that the presence of crushed pancreatic tissue and pancreatic juice in the peritoneal cavity, after abdominal section, would greatly enhance the danger of traumatic infection. For this reason, if for no other, the former should be removed and the escape of the latter prevented by ligation of the pancreas on the side, or each side, of the crushed or lacerated portion.

The cases of protrusion of the pancreas seem to establish the fact that a portion of this viscus may be separated by violence from the splenic artery and other important attachments, and may prolapse through an external wound, and under such circumstances can be removed without hazardous consequences. In most cases the prolapse followed some time after the injury from a sudden increase of intra-abdominal pressure, as coughing or straining at stool. Klebs and Hyrtl's objection to the possibility of a hernia of the pancreas, can find a plausible support only by assuming that the relations of the pancreas have not been disturbed. If, by the violence which produced the penetrating wound, the attachments of the organ are severed, or in case the attachments have been abnormally loose, or the duodenum is supplied with a long mesentery, there is no tenable reason why the pancreas should not occasionally be found protruding through the external wound. Cases are on record where the pancreas constituted one of the contents of a diaphragmatic hernia, and an instance is reported where it formed a part of the intussusceptum in a case of invagination of the bowel (Bandl).

The treatment of prolapse of the pancreas will depend upon the pathological condition of the viscus at the time the patient comes under the care of the surgeon. If the prolapse is recent and the organ presents no indication of inflammatory or other changes, it should be thoroughly disinfected and replaced. It is of the greatest importance not to resort to violence in effecting reduction, as irreparable damage may be inflicted by resorting to more than the gentlest force. When reduction is not readily accomplished, the wound should be enlarged. If the pancreas is in a condition of inflammation or gangrene, the parts should be thoroughly disinfected and the organ pulled further into the wound until healthy tissue is reached, when a ligature is applied and the diseased portion removed with the knife or scissors. After another thorough disinfection the stump is dropped into the abdominal cavity and the external wound closed. Thorough primary removal of infected tissue is the only safety against subsequent extension of the infection to the peritoneal cavity, and the only guarantee for primary union of the abdominal wound.

In gunshot wounds of the pancreas we have no guiding symptoms upon which to base even a probable diagnosis. The point of entrance and exit of the ball, and its probable course, are the only facts which may point to the pancreas as one of the injured organs. In four of the five cases the projectile penetrated posteriorly in the space between the angle of the left scapula and the angles of the ribs, and passed through the diaphragm and the solar plexus; in one, the ball entered anteriorly near the tip of the xiphoid cartilage, and was believed to have passed through the stomach.

It is a notable and somewhat significant fact, that in all cases where life was prolonged for more than twelve days, the pancreas appeared to have undergone but little or no pathological change in the vicinity of the visceral wound. Although in all cases the track of the ball did not remain aseptic, the inflammatory changes did not materially affect the parenchyma of the gland.

In Case XIII. the formation of a capsule around the bullet had already been initiated, and if the patient had lived there is every reason to believe that the foreign body would have become encysted in the parenchyma of the pancreas. Gunshot injuries of the pancreas, when they come under the observation of the surgeon as an independent lesion, or as a complication of other visceral injuries in cases of penetrating wounds of the abdomen treated by laparotomy, should be treated in the same way as a contusion or laceration of the gland. The results obtained by the experiments have shown that if only a comparatively small portion of the pancreas remains in physiological connection with the duodenum, this portion of the gland retains its normal structure and its physiological function, which, in all of the experimental cases, was found

adequate to supply the requisite quantity of pancreatic juice necessary for the maintenance of normal digestion. While the surgeon may unhesitatingly remove the tail and a portion of the body of the pancreas without fear of any immediate or remote ill effects, great care must be exercised in operating in the vicinity of the head of the pancreas to preserve the integrity of the common duct, and as much of this portion of the organ as may appear compatible with the condition which necessitated the operation.

The results of the experiments made with a view to ascertain how much of the mesentery of the duodenum can be detached without causing gangrene of the bowel have been such as to encourage a conservative plan of treatment when operating in close proximity to the intestine. The observations made in this direction have shown that it is comparatively safe to detach a portion of the mesentery even to the extent of one to three inches, a procedure incomparably easier and much safer than enterectomy combined with partial excision of the head of the pancreas. I wish again to emphasize the fact that complete extirpation of the head of the pancreas with the common duct is never justifiable, and that operations upon this portion of the gland for injury or disease, for the present at least, must be limited to partial excision of the head, with preservation of the common duct.

ACUTE PANCREATITIS.

Acute idiopathic pancreatitis is an exceedingly rare affection; only a few well-authenticated cases of the disease have been reported. A brief consideration of this affection is necessary in connection with our subject for the purpose of calling attention to a few of the most constant and prominent symptoms which characterize the disease, inasmuch as all suppurative lesions of this organ, which are of special interest to the surgeon, are preceded by inflammation. The disease originates either primarily in the inter-acinous connective tissue of the organ as a pancreatitis, or it occurs as a secondary disease from extension of a peripancratis to the substance of the gland. Haller and Klob have given an accurate clinical description of a case observed at the Allgemeine Krankenhaus in Vienna, with a careful account of the post-mortem appearances (*Schmidt's Jahrbücher*, 1860, vol. i. p. 306).

CASE I.—A gilder, sixty-three years of age, had been suffering from indigestion, which was referred to a defective stomach digestion. Flatulency and vomiting were prominent symptoms. The patient was anæmic, and presented a cachectic appearance; tongue slightly coated, anorexia, epigastrium tympanitic and tender to pressure. Vomiting of a thin, yellow, bitter fluid. Slight elevation of temperature; pulse 90; lower extremities œdematous. The same evening vomiting, collapse, and great pain in epigastrium, extending over the abdomen. During the night obstinate vomiting, traces of blood in the ejected matter; urine dark colored, contained no albumen. Next day vomiting ceased, but collapse increased, followed by death toward evening. The autopsy revealed serous infiltration of gray matter of brain and lungs.

Stomach collapsed, its mucous membrane bulging. The posterior wall of the stomach was perforated in three places, the openings being as large as a pea, and funnel shaped, with the larger extremity directed toward the peritoneal surface. The edges of these perforations were quite friable, discolored, and continuous with a fetid abscess cavity, which extended from the posterior surface of stomach to the spinal column, and from the spleen to the pylorus, in which the pancreas was found as a grayish, discolored, flabby, thin, and exceedingly fragile mass infiltrated with pus. In front of the anterior wall a fringed portion of the bursa omentalis was found, and on the upper border the arteria and vena lienales were seen; the latter was filled with a thrombus. Examined under the microscope the parenchyma of the gland showed that the cells were degenerated, being distended and turbid; acini separated, at some places collapsed, and the spaces between them contained granules and large globules of fat. In this case the course of the disease was quite acute, terminating in diffuse suppuration, and death after an illness lasting only sixteen days. The absence of disease in any of the adjacent organs, and the advanced pathological changes in the gland, pointed to the pancreas as the primary starting-point of the inflammation.

CASE II.—Mayo (*Outlines of Human Pathology*, London, 1836, p. 409) also gives an interesting description of a fatal case of subacute pancreatitis, with the post-mortem appearances. The patient, twenty-one years of age, when five months advanced in pregnancy lost her usual healthy appearance, and gradually became very anæmic. She complained of great thirst, and also suffered much from pain in the epigastric region, which was sometimes so severe as to oblige her to retire to her apartment. After her delivery the thirst remained, and the weakness and paleness increased. Her state and symptoms were like those of persons who have lost large quantities of blood. About five days before death the stomach became irritable, and nothing but rennet-whey in small quantities was retained. She died five weeks after delivery. Upon inspecting the body the viscera generally were found pale and bloodless. Except serous effusion on the membranes of the brain and the abdominal organs no pathological changes were observed, except that the pancreas was throughout of a deep and dull red color, which contrasted very remarkably with the bloodless condition of other parts. It was firm to the touch externally; and when an incision was made into it the divided lobules felt particularly firm and crisp.

CASE III.—Haidlen (*Centralblatt für Gynäkologie*, Sept. 29, 1884) reports the following case from Fehling's private practice. A woman, aged thirty-three years, became pregnant, and during the period of gestation had considerable gastric disturbance and headache. She remained well three weeks after delivery, when there was some hemorrhage. A little later she had two attacks of pain in the region of the stomach, and five and a half weeks after delivery she had a very severe attack of pain in the pyloric region, accompanied by vomiting. There was no elevation of temperature, the pulse was 100 to 104, and regular. The epigastric region was sensitive to pressure, but there were no symptoms of peritonitis, the skin was pale and not jaundiced. The patient seemed somewhat collapsed. In the afternoon of that day she seemed worse, the skin was paler, the pulse more rapid, and the vomiting had ceased. Physical examination showed marked swelling of the abdomen, and great sensibility of pyloric region. No pelvic disturbances. On the following day the patient was better, but the symptoms returned, and she died, in collapse, in ninety-six hours.

The autopsy showed that there was no peritonitis, though a small amount of a dirty, bloody-looking fluid was found in the lower part of the peritoneal cavity. The organs, with the exception of the pancreas, were normal. The pancreas had undergone considerable changes; it was larger, thicker, and broader than normal, and in only a few places was its normal color retained; it had changed almost entirely to a brownish-red, blood-suffused mass, containing a small clot of blood on the anterior surface, in contact with the mesentery, but there was no perforation anywhere. The adjacent portion of the mesentery was suffused with blood. Ziegler, who made the microscopic examination, pro-

nounced the case one of acute pancreatitis, and stated that the duct of Wirsung was somewhat dilated, and that he also found small-celled infiltration of the pancreatic tissue.

REMARKS.—The immunity of the pancreas from disease is attributed by Gross to the singular structure of this organ, to its concealed situation, and to the absence of everything like a proper envelope. (*Elements of Pathological Anatomy*, Philadelphia, 1857.)

The first two cases may serve as types of the two distinct forms of inflammation of the connective tissue of the pancreas, the suppurative and interstitial. Another form, the parenchymatous variety, is occasionally met with in the puerperal state, and in cases of typhoid fever, pyæmia, yellow fever, and other acute infectious diseases, the post-mortem appearances of which are illustrated by Case III. In this form the pancreas is red, swollen, and œdematous. Microscopically in this variety the most prominent lesion consists in swelling and undue granulation of the glandular epithelium and hyperæmia. (Delafield and Prudden, *Pathol. Anatomy and Histology*, New York, 1885, p. 369.)

In the first case the symptoms were acute, and the disease terminated in death in the short space of sixteen days. The suppurative inflammation beginning in the interstitial tissue involved the entire gland, and extended by continuity to the para- and peri-pancreatic tissue, giving rise to a diffuse and acute abscess. The termination is sufficient evidence that the inflammation was produced by a specific cause—the pus microbes. In the second case the primary seat of the inflammation was the same, but the process assumed a subacute character, and terminated in a hyperplasia of the connective tissue. The most prominent symptoms in both cases were severe pain in the epigastrium, progressive anæmia, and vomiting. In both cases the pain assumed a neuralgic character. The pain was referred to the region of the cœliac plexus, radiating from there over the abdomen. Neuralgia of the cœliac plexus is one of the most constant symptoms of disease of the pancreas, as Klebs alludes to it as being present eleven times in fifteen uncomplicated cases. Atrophy of the cœliac plexus is mentioned by Klebs as the cause of the neuralgia.

A high degree of anæmia was apparent in both cases from the extensive area of tissue which was found in an œdematous condition, as well as from the statement of Mayo, that his patient presented the appearance of a person who had suffered from repeated and severe hemorrhages. As the pancreas is not concerned directly in the function of hæmatogenesis, we can only explain the constancy with which this symptom is mentioned, by assuming that the anæmia was due to imperfect digestion and assimilation, caused by an arrest of pancreatic secretion. Vomiting was an early and troublesome symptom in the first case, but appeared only toward the close of the disease in the second case. No reference is made

to the condition of the stools in either case. The presence of undigested fat in the stools is, however, one of the rare symptoms of disease of the pancreas. Klebs states that in three cases where this symptom was present, the ductus Wirsungianus was either entirely or partially obliterated, while in a number of cases where the duct was in the same condition the stools remained normal.

CHRONIC INTERSTITIAL PANCREATITIS, OR SCLEROSIS OF THE PANCREAS.

This lesion consists in an increase of interstitial connective tissue which may affect the entire organ or remain limited to some particular portion, more especially the head of the gland. During the early stages of the disease the organ is enlarged, more vascular and firm, while later the cicatricial contraction of the interstitial deposit produces atrophy of the parenchyma, with a corresponding diminution in the size of the organ. This form of inflammation of the pancreas is of particular interest to the surgeon, as the cicatricial contraction may produce secondary changes in the pancreatic or bile-ducts, an occurrence which would indicate a resort to surgical measures for the relief of immediate symptoms due to retention of the secretions.

The causes which produce sclerosis are often obscure, but usually referable to some antecedent affection in some of the adjacent organs of the pancreas, as the peritoneum, subperitoneal tissue, duodenum, the common bile-duct, or pancreatic lithiasis, where the primary cause is in the pancreas itself. The connective tissue proliferation destroys the parenchyma by compression and constitutes one of the causes of stenosis of the pancreatic duct.

CASE I.—Todd (*Dublin Hospital Reports*, vol. i.) observed this condition in a girl fourteen years of age, in whom the head of the pancreas and the neighboring connective tissue were the seat of the disease. This case is of unusual interest, as the contraction of the cicatricial tissue produced obstruction of the common bile-duct by compression, which caused a dilatation of the bile-ducts behind the seat of obstruction, converting them into a large sac, which was located behind the duodenum and reached downward as far as the sacrum and laterally from one kidney to the other.

CASE II.—O. Wyss (Virchow and Hirsch's *Jahresbericht*) gives a description of another case in point. A man, fifty years of age, became deeply jaundiced and had from three to four loose, clay-colored stools daily. He died after an illness of four and a half months' duration. At the autopsy the liver was found enlarged and of a deep olive-green color. Gall-bladder and bile-ducts were much dilated and contained inspissated bile. The common bile-duct entered the head of the pancreas 4 cm. before its termination in the duodenum and traversed the indurated portion of the organ for a distance of 2.5 cm. At this point the duct was found so much contracted that only a fine probe could be passed through it. The common pancreatic duct was dilated, also its branches, which at some points were dilated in the form of cysts, varying in size from that of a hempseed to that of a hazelnut. Wyss attributed dilatation of the common duct to compression by one of the smaller cysts in the head of the pancreas, but it is more than probable that the dilatation was due to the cirrhotic contraction of the organ.

That icterus is not a constant symptom of this condition is illustrated by the following case, reported by Claessen.

CASE III.—A man, thirty years of age, had been subject to indigestion, constipation, and severe pain in the epigastrium for several years. After his death it was shown at the autopsy that the head of the pancreas and the acini were yellow, and the inter-acinous connective tissue abundant, and yet the duct of Wirsung and the bile-duct were not contracted.

REMARKS.—The surgical treatment of sclerosis of the pancreas can only apply to secondary lesions which result from stenosis of the pancreatic or bile-ducts and distention of these passages by accumulation of the secretions. Such an occurrence is most apt to take place when the disease affects the head of the pancreas, as the cicatricial contraction in this locality may cause stenosis of either the duct of Wirsung, the common bile-duct, or both. Any operative interference in these cases will be of necessity limited to an attempt to secure an artificial outlet to the retained secretion. The restoration of the permeability of the natural outlet by any method of treatment is entirely out of question.

The tendency of the disease is to aggravate the obstruction as cicatricial contraction progresses. The history of all these cases pointed to an impairment of digestion as the principal clinical feature in each instance. It is, therefore, of considerable importance to examine carefully into every obstinate and obscure case of indigestion, with a view to eliminate the possibility of organic disease of the pancreas as the cause of the derangement of digestion. In cases of permanent retention of the bile or the pancreatic juice caused by cicatricial compression of the bile-duct or the pancreatic duct, the earlier symptoms will have reference to a history of obstinate indigestion, progressive in its character. If, on the other hand, the obstruction is produced by the impaction of a calculus, the previous history points to attacks of sudden and severe pain and other symptoms indicative of the passage of a calculus along the excretory duct.

In case of biliary retention cysts, as represented in Case I., the establishment of an external biliary fistula would result in a permanent fistula, as the impermeability of the bile-duct would preclude the possibility of reëstablishing, by any kind of an attempt, the normal communication between the dilated bile passages and the intestine. Such an operation would remove only the urgent symptoms due to retention and absorption of bile, but would leave unchanged the primary cause of the retention and would exclude, permanently, the bile as a digestive fluid from the alimentary canal. As the obstruction is permanent and irremediable, the operation which suggests itself as fulfilling the urgent indications, as well as preventing remote ill consequences, is the formation of a new outlet for the bile into the intestinal canal, by establishing a permanent fistula between the duodenum and the gall-bladder, or

between the duodenum and the dilated bile-ducts. Duodeno-cholecystostomy has a future in all cases of permanent and incurable obstructive lesions in the bile-duct, and will become an established operation as soon as it has been perfected by an improved technique.

My experiments on animals have demonstrated that physiological detachment of any portion of the pancreas is invariably followed by degeneration and atrophy, irrespective of the particular method by which this detachment is effected, consequently it is only reasonable to assume that permanent obliteration of the pancreatic duct by cicatricial contraction is always followed by degeneration of the parenchyma of the gland on the distal side of the seat of obstruction.

It is on this account that stenosis of the pancreatic duct is seldom followed by dilatation of the ducts to any considerable extent on the distal side of the constriction, and even more seldom by the formation of a cyst. A retention cyst can result from obstruction only so long as secretion has not been entirely suspended, and when, at the same time, absorption of the pancreatic juice does not take place on account of further extensive pathological changes in the structures which perform this function when the gland is otherwise in a normal condition.

As the physiological detachment by obstruction of the common pancreatic duct caused by cicatricial contraction, is invariably followed by complete destruction of the parenchyma of the contributory portion of the gland, it is evident that the surgical treatment of a cyst of the pancreas in such cases can be indicated only when the swelling becomes, in itself, a source of serious inconvenience and pain. The proper treatment in all such cases consists in the formation of an external pancreatic fistula by abdominal section. There is no danger, in such instances, of the fistula remaining permanent, as the glandular tissue which might remain at the time of operation will, in the course of time, disappear by degeneration and absorption. As in animals, so in man, the health of the individual after gradual atrophy of the pancreas will depend upon the physiological capacity of vicarious organs, in each particular case, to assume the functions of the pancreas.

In recapitulation, it may be stated that cirrhosis or chronic interstitial pancreatitis sometimes produces stenosis of the bile-duct or the pancreatic duct, and that, when the obstruction is followed by retention of the secretions, an operation becomes always necessary in biliary retention, which should be treated by establishing a new outlet for the bile into the duodenum, while the formation of an external pancreatic fistula in cases of cyst of the pancreas becomes necessary only when the presence of the swelling in itself has become a source of sufficient pain and discomfort to warrant treatment by abdominal section.

GANGRENE OF THE PANCREAS.

One of the terminations of acute inflammation of the pancreas is gangrene. Cases have been reported where spontaneous recovery followed elimination of the necrosed organ through the alimentary canal. If spontaneous recovery in this condition is possible, it would seem plausible that a timely removal of the necrosed organ by surgical interference would add to the chances of recovery, consequently we shall add gangrene as one of the diseases of the pancreas which should be treated by operative measures.

CASE I.—Trafoyer, of Hernals, treated a patient suffering from what appeared to be a passage of gall-stones. During the course of the disease the patient passed, per rectum, a solid mass, the nature of which could not be readily ascertained. This mass was sent for examination to Rokitsky, who found in it gall-stones and a large part of the pancreas in which the duct was plainly visible. Rokitsky believed that a portion of the pancreas had become invaginated into the duodenum and had sloughed. Nothing could be ascertained concerning the subsequent history of the case. (*Allgem. Wiener Zeitung*, No. 29, 1862.)

CASE II.—Reported by Chiari (*Wiener med. Wochenschrift*, Nos. 6 and 7, 1881). Female, aged forty-six years, who had been subject to occasional attacks of pain in the stomach. She was seized suddenly with severe pain in the abdomen, followed by vomiting and other symptoms of diffuse peritonitis. Toward the close of the disease she had a chill, and vomited a black, very offensive fluid. At the necropsy the pancreas was found separated from all its attachments and of a brownish color. The duodenum and transverse mesocolon were perforated, and the bursa omentalis contained an offensive sanious fluid, consecutive to diffuse peritonitis. The pancreatico-duodenal artery was eroded.

CASE III.—(*Ibid.*) Patient, a man thirty-eight years of age, was attacked with symptoms indicative of cholelithiasis, followed by symptoms of obstruction of the bowels which lasted for a number of days, and subsided only after the patient passed, per rectum, the greater portion of the necrosed pancreas. The patient recovered.

CASE IV.—Israel reports (Virchow's *Archiv*, vol lxxxiii. p. 181) a case of necrosis of the pancreas in a patient suffering from diabetes mellitus. The autopsy showed a fluctuating tumor between the stomach and transverse colon which revealed itself as a cyst, with thick walls firmly adherent to the intact head of the pancreas. The cyst contained 300 c. cm. of a clay-colored fluid, in which crystals of hæmatoidin were found, and the necrosed body and tail of the pancreas. Israel attributes the cause of the destructive process to an inflammation of the peripancræatic tissue, which had given rise to repeated hemorrhages into and around the pancreas. The disease of the pancreas, he holds, was not the cause but the effect of the diabetes.

CASE V.—Prince ("Pancreatic Apoplexy, with a Report of Two Cases," *Boston Med. and Surg. Journ.*, July 13 and 20, 1883) reports the following case: A man, twenty-two years of age, during a violent exertion, was taken with a severe pain in the abdomen, followed by pain in the epigastric region, vomiting, chills, and a sensation of great oppression and uneasiness. In a few days diarrhœa followed, and during the third week he died. At the autopsy the anterior abdominal wall was found firmly adherent to the omentum and intestines; between the intestinal convolutions a chocolate-colored fluid was found. The greater portion of the pancreas was destroyed and converted into a black gangrenous mass. The mesentery of the upper portion of the jejunum, which was adherent to the lower margin of the transverse colon, showed in its folds an accumulation of thick greenish pus.

CASE VI.—Reported by Rosenbach (*Centralblatt für Chirurgie*, 1882). A woman, fifty-seven years of age, otherwise in good health, had suffered some time ago from pain in the abdomen and constipation, but was soon relieved. Three weeks before she came under observation of the reporter, the same trouble returned. The bowels had not moved for three days; frequent vomiting of greenish fluid; great weakness. On examination, a fluctuating tumor the size of a child's head, was detected in the epigastric region, behind the stomach, which was considerably dilated. The tumor was immovable. As the symptoms pointed to intestinal obstruction of some kind, and failed to be relieved by enemata, it was decided to perform laparotomy, to which the patient readily consented. The abdomen was opened through the median line, but, as the tumor was not rendered sufficiently accessible, a transverse incision was made over the part most prominent. After division of the mesocolon an effort was made to enucleate the tumor, but the inflammatory adhesions were so firm that the attempt had to be abandoned. An effort was then made to push the stomach upward, but this likewise failed. During these manipulations the tumor ruptured and at first clear, then turbid offensive fluid poured out. The fluid was removed without soiling the peritoneal cavity. The sac was then stitched to the margins of the wound. After suturing the remaining portion of the external incision the opening in the sac was enlarged and drained. The patient died of shock six hours after the operation. At the autopsy the necrosed pancreas was found in the sac. The abscess cavity extended behind the stomach and lesser omentum. The intestinal obstruction was caused by pressure of the swelling upon the small intestine.

REMARKS.—The pancreas may constitute one of the component parts of the intussusceptum in cases of invagination of the bowels, as such a case has been reported by Bandl, and the specimen examined by Rokitsky furnishes a similar illustration. The second case reported by Chiari may have been of a similar nature, the invaginated portion having sloughed with the remaining portion of the intussusceptum, leaving the continuity of the bowel unimpaired by adhesions at the point of separation. If, in this instance, the necrosis was due to inflammation, we can only infer that the parapancreatic abscess ruptured into the bowel, and that the necrosed portion of the pancreas was eliminated in this manner, and that subsequently the opening in the bowel was closed. Constipation was a prominent symptom in a number of these cases, and in Rosenbach's case the symptoms of obstruction were so well marked that it was decided to perform laparotomy for its relief. This last case is also of great interest, as during life the existence of a tumor in the region of the pancreas was diagnosticated.

Modern surgery deals extensively with abdominal section for the relief and cure of peritonitis and intestinal obstruction. In searching for the cause of either of these conditions during laparotomy, the pancreas should not be forgotten, and when it is found that the primary disease is located in or around this organ, radical measures should be adopted whenever such a course appears practicable.

Whenever the sac can be stitched to the external incision this should be done, and the sac opened, disinfected, and drained. Search should be made for the necrosed pancreas, and when found detached it should

be removed. As in most of these cases the retroperitoneal tissue is extensively infiltrated, a counter-opening should be made in the lumbar region, and through drainage established. If an anterior abdominal fistula cannot be established, the course to be pursued should be the same as in treating a pancreatic abscess under similar conditions.

ABSCESS OF THE PANCREAS.

At the present time no one familiar with the recent advances in surgery would question the propriety of treating a suppurating cavity by incision and drainage, wherever it might be located. Some of the most valuable recent contributions to surgical literature describe improved methods in treating deep-seated abscesses. Asepsis and effective drainage are the two cardinal points upon which we have learned to depend in the treatment of abscesses in important organs or cavities. If we can secure and maintain these two essential conditions, we can attack with immunity and a fair hope of success, any abscess wherever it may be located, and whatever its immediate surroundings may be.

In looking over the literature on abscesses of the abdominal organs, we find that modern surgery has been guided almost exclusively by the teaching of the old master: *Ubi pus—ibi evacuo*. It is somewhat surprising that abscess of the pancreas has never been made the subject of surgical treatment. The two principal reasons for this may be found in the facts that abscess of the pancreas is of rare occurrence, and that the recognition of the lesion, when it does exist, is surrounded by many difficulties. There can be no doubt, however, that in the near future abscess of the pancreas will be treated on the same principles as suppuration in any other locality.

The remote location of the abscess may offer many serious obstacles to diagnosis and a rational course of treatment; but these difficulties will be overcome by improved methods of examination, and more perfect methods of operation. As suppuration is only one of the terminations of inflammation, abscess, like inflammation, may occur primarily in the gland itself, or it may commence in the para- or peri-pancreatic tissue. If the abscess is endo-pancreatic, it may be bounded and circumscribed by the proper investment of the gland; if, on the other hand, it commences primarily outside of the gland, it appears as a diffuse abscess, which extends to the pancreas by contiguity; in other words, we speak of the abscess as a suppurative pancreatitis, or a suppurative peri- or para-pancreatitis.

CASE I.—Frison ("Pancreatite suppurée," *Recueil de mém. de méd. mil.*, Mai, Juin, 1876) reports a case of abscess of the pancreas following suppurative pancreatitis, where the collection of pus did not extend beyond the limits of the gland. An otherwise healthy mulatto, twenty-eight years of age, farmer, was attacked in June, 1873, by icterus with no fever. Appetite diminished. The symptoms were not of sufficient severity to keep him from his work. In

August he complained of pain in the right hypochondriac region, which was soon followed by ascites and œdema of legs and scrotum. He was troubled at this time by an intense thirst and voided large quantities of urine, which, on examination, was found to contain sugar. The liver was enlarged and the patient emaciated rapidly. No fever or diarrhœa. Stools clay colored. Appetite gradually declined and the patient died in a state of advanced marasmus.

Autopsy. Intestines and stomach normal. Pancreas enlarged to three times its normal size and infiltrated with pus; the splenic end was distended by a large abscess. Gall-bladder and bile-ducts greatly distended. Liver olive-green in color and contained three abscesses, but otherwise healthy in structure.

REMARKS.—In this case the symptoms during life pointed to the liver as the seat of the disease. The jaundice was undoubtedly produced by stenosis of the bile-duct, either by a catarrhal inflammation of the duct itself, or compression of the duct by the inflammatory exudation which attended the acute inflammation of the pancreas. The ascites was more likely the result of an inflammation of the peritoneum overlying the pancreas than of an obstruction to the portal circulation. The suppuration in the pancreas was not attended by an increase of temperature. The diabetes was probably due to the disease of the pancreas, and was not a coincident affection, as a number of cases of diabetes have been reported which occurred in the course of some disease of this organ.

CASE II.—Timoteo Riboli (*Schmidt's Jahrbücher*, 1859, 2, p. 177) reports the case of a woman, aged fifty-seven years, who suffered from impairment of digestion, loss of appetite, emaciation, and attacks of vomiting in the forenoon. The tongue was coated. No fever, but night sweats. Bismuth and magnesia improved the symptoms for a time, but soon the disease became aggravated. Hepatitis was diagnosed, inasmuch as the patient became icteric and complained of a deeply seated dull pain in the region of the liver and epigastrium. Among a number of colleagues who saw the case in consultation, Tommasini was the only one who believed that the pancreas was the seat of the disease. The patient was emaciated to a skeleton and died of inanition. At the autopsy the pancreas was found distended with pus. Gall-bladder was distended with bile. Liver congested. No other pathological conditions were found, which might serve to explain the cause of death.

REMARKS.—The course of the disease in this case was again afebrile. The symptoms simulated disease of the liver even more closely than in the preceding case, as no mention is made of the presence of sugar in the urine. The suppuration did not extend into the para-pancreatic space.

CASE III.—The following case is described by Dr. James Kilgour (*London Journal*, Nov. 1850). The patient was a man, forty-one years of age, who was treated for several years for what was termed bilious dyspepsia. In March, 1850, when first seen by the reporter, he was considerably emaciated and of a melancholic disposition. A prominent symptom was vomiting, especially in the morning, and about two hours after meals. The matter vomited was a sour, viscid fluid, varying in quantity from an ounce to a quart. Skin dry and of a yellowish hue. No diarrhœa, and the stools contained no bile. Urine of sp. gr. 1.022, normal in quantity, loaded with urates and contained some fat. Pulse small, 100. No pain in abdomen. On left side, from bor-

der of stomach to crest of ilium, abdomen was dull on percussion, on palpation inelastic, nodulated, and of a doughy feel. The area of the swelling was not well defined. Neither fluctuation nor pulsation could be felt. During the middle of the month of May, the patient complained of chilly sensations, and the area of dullness increased toward the left. Toward the end of the month the chills disappeared and the abdomen became tender and elastic above. During the latter part of July, the legs became cedematous and the patient was somewhat delirious. Toward the close of the disease he was again attacked by a number of chills and died July 28th.

Autopsy. Stomach distended with gas, walls very thin, pylorus indurated and slightly narrowed. Duodenum softened by inflammation, the portion near the pancreas being converted into a pultaceous mass. Liver normal. Spleen enlarged one-third. Pancreas enlarged to the size of a teacup, its left end being attached to the suprarenal capsule on same side. On incising the pancreas a milky fluid escaped. The entire gland was converted into a single sac, which contained purulent fluid with some cheesy particles and fragments of cellular tissue.

REMARKS.—In this case the symptoms were sufficiently clear which would, at the present time, enable an accurate observer to make a probable diagnosis of abscess of the pancreas. The obstinate vomiting, with the absence of signs of disease of the liver and the progressive emaciation should have led at least to a suspicion of disease of the pancreas.

The location of the tumor was also suggestive of the primary starting-point of the swelling. The abscess cavity was larger than in the preceding cases, and the presence of pus was also suggested by the chills which were present at the beginning and close of the disease. As the abscess cavity was single, this would have been a proper case for surgical treatment. A somewhat uncommon feature in this case was almost complete absence of pain, a symptom which has been considered by Claessen characteristic of disease of the pancreas. The character of the fluid in the cyst would indicate that it was a mixture of pus and pancreatic juice. As in other secretory organs, the suppurative process may commence in the duct and extend to the interstitial connective tissue by continuity. This is the manner in which the presence of foreign bodies, such as parasites or calculi, in the duct, gives rise to abscess of the pancreas. In the following case the inflammation of the duct and the consecutive interstitial suppurative pancreatitis were attributed to the presence of an intestinal worm.

CASE IV.—Reported by Shea (*Lancet*, November 5, 1881). The patient was a woman, aged twenty-nine years, who complained of abdominal pain and was jaundiced. After a few days, she improved under a mild alkaline treatment, but about three weeks subsequently again became worse. The pain was in the region of the pancreas. At the same time she suffered from nausea followed by vomiting; jaundice reappeared. Active treatment was resorted to, but she soon became unconscious and died forty-eight hours subsequently. The necropsy showed that the body was fairly nourished and distinctly jaundiced. The lungs were slightly congested at the base. Liver large, pale, and soft. Pancreas enlarged and hard, being the seat of an abscess containing pus. A round worm, seven inches long, was found folded upon itself, lying in and obstructing the pancreatic duct, the larger portion of the worm being in the duodenum. The intestines were healthy. In the

absence of any other disease, death in this instance must have resulted from inflammation of the duct and parenchyma of the pancreas by the irritation induced by the presence of the worm. The jaundice was undoubtedly produced by the same cause.

Positive evidence is wanting in this case to prove that the suppuration was caused by the presence of the parasite, as the worm might have entered the pancreatic duct after death. We have evidence that in many cases ascarides were found in the ductus pancreaticus, without the presence of abscess or even inflammation. Davaine (*Traité des Entoz.*, p. 115) relates that he has found them present in this locality in four cases, and in none of them had secondary inflammatory changes taken place. Klebs found six worms in one case, four in the head and two in the tail of the pancreas.

CASE V.—Mayo refers to a case that came under the observation of Percival (*Outlines of Human Pathology*, London, 1836, p. 409). The patient was a gentleman who had jaundice and bilious vomiting. A tumor appeared at the epigastrium; his strength failed; blood and fetid pus were discharged by stool, and he died exhausted in three months. At the necropsy the pancreas was found greatly enlarged and contained a considerable abscess; the ductus communis was obliterated by the pressure.

The class of cases which are of special importance and interest to the surgeon are those diffuse abscesses which take their origin in the parapancreatic connective tissue: extensive collections of pus as we observe them in cases of parapancreatitis purulenta. As the glandular tissue is not primarily affected in these cases, early evacuation and drainage of the abscess cavity would not only preserve the anatomical and functional integrity of the gland, but would also serve as a life-saving measure by securing an early outlet of the abscess contents.

The case reported by Haller and Klob, and referred to under the head of pancreatitis, Case I., furnishes a good illustration of cases belonging to this class.

CASE VI.—An interesting case of abscess of the pancreas has recently been reported by Musser (*AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, April, 1886, p. 449). The patient was a male, aged forty-two, shoemaker, who was admitted to the wards of the Presbyterian Hospital, May 12, 1885, and died June 6th following.

He was of intemperate habits, but his general health had always been good. His poverty had exposed him to all kinds of hardships. The duration of the present illness was not known, but from his statements it was ascertained that his health had been failing all spring. He had never received any injury. He was considerably emaciated. He vomited only once, and that was on the day of admission. Marked ascites was observed, but nothing else could be found. He remained in a stupid condition, took but little food, and manifested no signs of pain. No fever, no sweating. Palpation showed the liver and spleen to be normal, while an ill-defined tumor could be felt in the epigastric region. Urine contained a trace of albumen, but no casts. The ascites was so great as to warrant tapping, and this was accordingly done. The abdomen was thirty-six inches in circumference at the umbilicus before tapping. Within eighteen hours after tapping, it had filled entirely, and in twenty-four hours measured thirty-two and a half inches. He died of exhaustion.

After death, by palpation a fixed mass was detected in the abdomen, extending from the right mammary line, one inch above the umbilical line, directly across to the corresponding line on the left side. Its upper margin was not well defined, but it appeared to be two inches wide. The abdomen was filled with serum in which some lymph floated. The intestines were matted together by recent lymph. The peritoneum showed signs of inflammation. Corresponding to the position of the mass indicated by palpation, the omentum was found matted together, with its inferior border turned upward, and lying across the stomach. This organ was fixed and dilated, its inferior border extending to the umbilicus. The liver occupied its normal position. The transverse colon extended across the abdomen along the lower margin of the stomach, thus permitting the omentum to occupy the position indicated above. Further study of the relations of the abdominal organs revealed the formation of a large cavity containing about a quart of pus. This cavity was formed by the posterior wall of the stomach in front, by the pancreas, duodenum, and transverse colon below, and by an extension, or rather distention, of the peritoneum above and behind. Certainly the pus did not fill the retroperitoneal space or extend into it, and was not in close apposition to the diaphragm or brim. It was situated in the duodeno-jejunal fossa. Adhesions prevented communication with the abdominal cavity and the retroperitoneal space. This abscess cavity communicated with a large abscess in the pancreas. This abscess, of the size of an orange, was situated in the head of the organ, its point of rupture into the duodeno-jejunal fossa being in the middle and upper part.

The remainder of the pancreas was made up of dense connective tissue, throughout which there were innumerable pus pockets, varying from a pea to a pecan nut in size. The secreting tissue of the organ was not discernible to the naked eye. The ducts were not occluded, but rather dilated, and no calculi were found. The portal vein was filled with a purulent thrombus. The splenic vein was also partially closed by a soft thrombus. The superior and inferior mesenteric veins were completely blocked by firm, laminated thrombi, which were firmly adherent to their walls. On microscopical examination, the pancreas was found to be made up of old and young connective tissue; in the large interstices of the bundles of old tissue, the glandular structure could be readily made out, while the tubules were seen to be in a state of catarrhal inflammation. The intertubular connective tissue was crowded with young cells.

REMARKS.—In this case the conditions were favorable for successful treatment by abdominal section had even a probable diagnosis been made before the extensive and serious complication of thrombophlebitis occurred. The symptoms during life simulated cirrhosis of the liver so closely that it was impossible to differentiate between this affection and disease of the pancreas, although an ill-defined tumor could be felt in the epigastric region. In similar cases an exploratory laparotomy should be done for the purpose of making a positive diagnosis, and, when similar favorable conditions are found, it could be followed at once by radical measures with a view of securing evacuation and drainage of the abscess cavity. In this case the abscesses in the viscus were the result of a purulent pancreatitis; the secondary abscess, of perforation into the duodeno-jejunal fossa followed by suppurative peripancreatitis.

Recent investigations have shown the existence of a direct causative relation between the pus microbes and suppuration, hence we must take it for granted that every purulent pancreatitis, peripancreatitis, or para-

pancreatitis is caused by the presence of these germs in the tissues. In case there is no direct invasion by a loss of continuity of the hollow viscera in the vicinity of the pancreas, or no direct communication with the external air by a penetrating wound, we must assume that the germs reach the gland through the circulation, and find a favorable soil prepared by some antecedent pathological changes. Such conditions may be determined by contusion of the organ, disturbance of the capillary circulation by various causes, or thrombophlebitis. Norman Moore reports the case of a female, twenty-seven years of age, who had died of pyophlebitis, and where, on post-mortem examination, beside the portal, splenic, and vena azygos minor veins, the pancreatic veins were also blocked by decolorized and adherent thrombi. ("Pathological Observations on the Pancreas," *St. Bartholomew's Hospital Reports*, vol. xviii. p. 207.)

In the *Pathological Society's Transactions* the same author gives an account of two cases of abscess of the pancreas due to plugging of the pancreatic vessels. On page 210 he remarks:

"Pathologically, the case in which thrombosis of the pancreas was found is interesting as indicating how pancreatic abscess is produced. The much commoner condition of the liver in the other cases shows that, had the first patient survived, the thrombosis would certainly have been followed by abscess. Clinically, the value of the case is, that it may, in rare cases, help to explain the seat of an obscure abdominal swelling, associated with fever, which has followed a thrombosis, and which physical examination cannot localize in the liver."

Suppuration always begins in the interstitial tissue, either within the gland or in the connective tissue around it. A suppurative inflammation and formation of an abscess are different stages of the same process. Peripancreatic suppuration commences, in most instances, in the adjacent lymphatics, the pus surrounding the lymph glands, or forming a small abscess.

In the vicinity of the pancreas these perilymphatic abscesses are not unfrequently met with as one of the pathological conditions of pyæmia. Thus, an abscess in the pancreas with perforation into the peritoneal cavity, was examined by Perle (*De Pancreas ejusque morbis*, Dissert. Berol., 1837). Tulpius saw an abscess of the pancreas as a secondary lesion after an attack of malarial fever. Schmackpfeffer observed the same conditions after an operation for strangulated hernia, and Portal after extirpation of a testicle. But suppuration in the pancreas sometimes takes place as an independent affection, without the presence of an appreciable infection-atrrium, and in these cases we must assume that the essential and specific noxæ are carried along with the circulating blood, and that localization takes place upon a soil prepared for their reception and growth by previous alteration in texture or circulation. In some instances the process begins upon the outer surface of the gland, the pus

separating the gland from its attachments. In the case described by Gendrin the pancreas appeared to have been completely detached, and was lying loose in the abscess cavity.

Many of these parapancreatic abscesses do not present well-defined borders; the pus manifests a tendency to burrow in the vicinity of the mesocolon and the retroperitoneal space, and is apt to perforate into the bursa omentalis, or into some other portion of the peritoneal cavity, or, lastly, finds its way into one of the adjacent hollow organs, as the stomach or intestinal tract. Van Doeveren reports the case of a female, fifty-nine years of age, who had suffered for thirty years from attacks of gastralgia. At the necropsy, it was ascertained that the indurated pancreas had perforated the posterior wall of the stomach. The opening represented a round ulcer, two and a half inches in diameter, with indurated margins. In this aperture eroded vessels could be seen. The fistulous tract communicated with the pancreatic duct. The stomach and intestines contained blood, but no other evidences of disease could be found. In Percival's case the abscess ruptured into the bowel, the stools containing fetid pus and blood. A similar case was observed by Haggarth (*Transactions of the College of Physicians in Ireland*, vol. ii.). The suppurative process, however, may extend in an opposite direction, from the stomach to the pancreas (Rokitansky, *Lehrbuch der pathol. Anatomie*, Wien, vol. iii. p. 168). A communication between the stomach and pancreas is sometimes established by perforation of a gastric ulcer in this direction. Around the margins of the ulcer, between the stomach and pancreas, adhesions are formed, an occurrence which prevents extravasation of the contents of the stomach into the peritoneal cavity. A number of the terminal openings of the ductilis pancreatidis have been observed upon the cicatrized surface of a gastric ulcer. In place of the formation of a permanent pancreatico-gastric fistula, as described by Rokitansky, perforation of the stomach in closer proximity to the pancreas may give rise to diffuse and rapidly fatal parapancreatitis or peripancratis.

The indirect primary cause of a pancreatic abscess may be due to the presence of a calculus in the pancreatic duct. Fournier has recorded a case where, on post-mortem examination, an enormous abscess was found in the head of the pancreas, which contained numerous calculi. The tumor was sufficiently large to be readily detected in the epigastric region during life.

An abscess of the pancreas may also originate in a preëxisting cyst of the organ. Kilgour's case, detailed above, had undoubtedly such an origin. The abscess cavity was as large as a teacup, and contained a milky fluid and caseous particles, which were undoubtedly a mixture of pus and pancreatic juice. The disease was attended by chills and fever, which indicated that the retention cyst had become the seat of an acute suppurative inflammation.

As primary, idiopathic, uncomplicated, purulent inflammation of the pancreas is an exceedingly rare affection, it is of great practical importance in the surgical treatment of such cases to determine, if possible, the predisposing cause or causes, and to remove them, or render them inert at the time of operation.

The presence of pus within the pancreas or in its immediate vicinity is not indicated by any characteristic or positive symptoms. The symptoms always point to the stomach or liver as the seat of the disease. The most prominent and constant symptoms which have been observed are nausea, vomiting of a clear greenish or viscid fluid, thirst, loss of appetite, constipation, progressive emaciation, and distention of the epigastrium.

In most all cases the patients presented a sallow, cachectic appearance, and were exceedingly anæmic. Ascites and œdema of the lower extremities were present a number of times. In several instances the inflammatory process in the pancreas extended to the bile-duct, or caused stenosis of the duct by compression, conditions which are followed by biliary retention, a symptom which has been usually interpreted as an evidence of primary disease of the liver or bile-ducts. The progressive anæmia and emaciation, in the absence of other tangible lesions, are symptoms which always should direct attention to the pancreas as the seat of the disease.

Fever was seldom a conspicuous and never a constant symptom of suppurative pancreatitis. The use of the thermometer in the diagnosis of suppuration in this locality is important, but it furnishes no positive evidence. If the abscess is large it will be recognized by palpation and deep percussion as a tumor in the epigastric region. In such cases a probable diagnosis may be made by a careful and systematic physical examination and reasoning by exclusion.

An abscess within the gland is always located in the bursa omentalis; a peripancreatic abscess in the bursa omentalis, duodeno-jejunal fossa, or upper portion of the peritoneal cavity; and a parapancreatic abscess in the retroperitoneal space. Inflation of the stomach will often serve a useful purpose in the differential diagnosis of tumors in the epigastric region. In obscure cases, manual exploration of the rectum may add important and sometimes decisive information.

Age is also an important element to be considered in the diagnosis. Most of the cases of abscess of the pancreas were patients of more than forty years of age, and often persons of intemperate habits. Puncture with an aseptic capillary needle will demonstrate the presence or absence of pus, but will not add material information in locating with accuracy the abscess cavity.

Finally, in all cases where a tumor can be felt in the epigastric region, and a probable diagnosis can be made regarding its benign character, an

exploratory laparotomy should be resorted to for the purpose of making an accurate anatomical diagnosis.

The prognosis of abscess of the pancreas is always unfavorable. Death is produced by progressive emaciation and inanition, by septic absorption, or secondary lesions in adjacent organs. In acute, diffuse pancreatic abscess a fatal termination may take place in a few days. One of the great dangers of abscess in this locality is the close proximity of numerous important veins, which become implicated by extension of the suppurative inflammation to their walls, producing a suppurative thrombophlebitis, with all its disastrous consequences. Perforation of the abscess into the stomach or intestinal tract is the most favorable spontaneous termination, and has resulted, at least in one instance, in a cure. Perforation of the abscess into the peritoneal cavity would hasten death by inducing a rapidly fatal septic peritonitis.

The remarkable success which has attended the treatment of pelvic and abdominal abscesses by laparotomy justifies the hope that, in the near future, the same treatment will be extended to abscess of the pancreas. It is true that the difficulties which surround the treatment of abscesses in this region are many, but they are not insurmountable. Multiple abscesses, disseminated throughout the entire organ, and especially its head, are not amenable to successful surgical treatment. Circumscribed endopancreatic abscess in the peripheral portion of the body or tail of the pancreas should be treated by partial excision of the pancreas in all cases where the isolation of that portion of the organ can be accomplished without inflicting serious injury to adjacent important organs. When extirpation is impossible, as when the abscess is located in the head of the pancreas, it must be treated by incision and drainage. This is accomplished in the same manner as in the treatment of a pancreatic cyst. In some instances, the access to the abscess is rendered difficult by distention of the stomach, the dilated organ overlapping the pancreas. In such cases, the stomach must be pushed upward, and subsequent distention guarded against by ordering an absolute diet until the external fistula has been established. The external incision must, in all cases, correspond to the most prominent part of the swelling, as it is of the greatest importance to incise the abscess at a point where the distance between the surface of the abscess and the abdominal wall is the shortest. Incision of the great omentum will be required in all instances.

In making an external fistula in the treatment of a pancreatic abscess it is essential to protect the muscular and connective tissues of the external incision against the contact with pus by lining the margins of the wound with the parietal peritoneum before the serous covering of the anterior wall of the abscess is stitched to the margins of the wound. One of the greatest difficulties that will be encountered in this operation

will be the approximation of the peritoneal surface of the abscess with the margins of the wound, on account of the distance between the surface of the abscess and the anterior abdominal wall; this difficulty will decrease in proportion to the prominence of the swelling.

The size of the external incision will exert an important influence in this direction. If the incision is large the margins of the wound can be turned inward, thus facilitating the suturing of the anterior wall of the abscess to the margins of the wound. As a rule, it may be relied upon that the anterior wall of the abscess, covered by peritoneum, is quite thick, so that there is but little danger of penetrating the abscess cavity with the needle in suturing. Previous evacuation of the abscess cavity by aspiration would diminish the danger of extravasation of pus through the needle punctures, but would also render approximation difficult by the recession of the abscess wall, and should, therefore, not be resorted to unless the swelling is sufficiently prominent to render this circumstance of little importance.

As the suturing of the two peritoneal surfaces is done for the purpose of preventing, in the first place, extravasation of pus into the peritoneal cavity; and, secondly, of securing permanent adhesions between the abscess wall and the margins of the wound, it is important to apply the sutures closely together and to grasp the tissues in such a manner that tearing through of the sutures is impossible. As considerable tension may follow, it would be advisable, in this particular instance, to use silk sutures. As in these cases time is an important element, incision and drainage should follow suturing immediately.

The remaining steps of the operation will depend upon circumstances. If the abscess is endopancræatic or peripancræatic, simple incision, drainage, and disinfection will answer all indications. If, however, the purulent cavity is located behind the peritoneum and occupies the connective tissue space behind the pancreas, it would appear rational to drain the abscess posteriorly through one of the lumbar regions above the kidney by pushing a long closed forceps in a proper direction through the posterior and lateral wall of the abscess until its point can be felt under the skin externally. A small cut in the skin over its point will enable the operator to push the instrument clear through, and, by dilating its blades, widen the canal sufficiently to permit the insertion of a large drainage tube. In this manner the most desirable method of drainage—through drainage—could be established, which would render subsequent disinfection and evacuation of the abscess a comparatively easy task. In cases where an anterior pancreatic fistula cannot be established on account of the distance between the abscess and the anterior abdominal wall, we might resort to lumbar drainage and closure of the incision in the anterior wall of the abscess by carefully inverting and approximating the peritoneum over the wound with fine silk sutures.

That the utmost care in the application of antiseptic precautions should be resorted to in the evacuation of pus in this remote region by any of these procedures requires no argument. I will repeat that a positive diagnosis of the presence and precise location of a pancreatic abscess is only possible by resorting to explorative laparotomy, and that this diagnostical aid should be always resorted to when the history of the case and the symptoms and signs presented are sufficiently suggestive to point to a probable diagnosis.

The abscess found and located by abdominal section should be removed by partial extirpation of the pancreas when it is endopancreatic and located near the splenic end of the pancreas. When extirpation is impossible, or when it is located in the head or on the anterior surface of the pancreas, it should be treated by the formation of an anterior abdominal fistula; when located behind the pancreas, by through drainage, or lumbar drainage performed through the abdominal cavity.

HEMORRHAGE OF THE PANCREAS.

A number of post-mortem examinations have shown that certain cases of sudden death were caused by hemorrhage of the pancreas, inasmuch as no other evidences were found which could explain the cause of death. In some as yet unaccountable way, even a moderate hemorrhage in this locality has been sufficient to destroy life. Zenker has affirmed that in these cases pressure upon the solar plexus and semilunar ganglion produces paralysis of the heart, to which he attributes the immediate cause of death. If we recollect that tumors of the pancreas, even when of considerable size, do not destroy life in this manner, it seems that the true explanation of the great danger which attends hemorrhage of the pancreas remains to be ascertained. Practically it is important to differentiate between diffuse hemorrhage into the substance of the organ and its adjacent tissue, and circumscribed accumulations of blood or hemorrhagic cysts of the pancreas, as the latter condition presents more favorable conditions for surgical treatment.

Hemorrhagic Cysts.

CASE I.—Anger (*Bulletin de la société anatomique de Paris*, xl., Année 1865, 2me série, tome x. p. 192) reports a case of hemorrhagic cyst of the pancreas in a man, aged seventy-two years, who had been a soldier for ten years, during which time he had received several wounds. Later he suffered fracture of several ribs on the left side from a severe contusion, from which injury, however, he recovered completely after three months' treatment in the hospital. No history of syphilis. Five months ago lower limbs became oedematous and for the last six weeks ascites was present. He was admitted into the Beaujon Hospital February 27, 1865. At this time the following conditions were noted: Oedema of lower extremities; ascites; breathing difficult and stertorous; bronchitis on left side of chest, and hydrothorax on opposite side. Diaphragm pushed upward. Pulse 100, irregular and intermittent. Diar-

rhœa and loss of appetite. No delirium. Urine contained no albumen. A stimulating treatment was adopted. March 1st the patient died, the pulse having been for a time exceedingly feeble and intermittent. The breathing toward the last was very labored and the patient was unable to lie down.

Autopsy. Pleuritic effusion on left side, bronchitis. Liver small, somewhat contracted, but not cirrhotic. Serous effusion in pericardium; heart dilated, mitral valve insufficient. On opening the abdomen a tumor, the size of a foetal head, was found in front of and on the same niveau with the left kidney. This tumor was bounded in front by the stomach and the transverse colon, above by the diaphragm, below by the descending colon, behind by the kidney, toward the median line by the pancreas, and on the outside and above by the spleen. The tumor was loosely connected with the kidney and spleen by connective tissue, in which the vessels of these organs could be readily seen. The tumor was evidently connected with the pancreas. The external surface of the tumor was irregular and nodulated, the anterior wall of variable thickness. Fluctuation plain. The vessels of the spleen were intimately connected with the posterior surface and were not easily isolated. On careful dissection the lobules of the pancreas could be separated from the tumor, but the walls of the tumor contained a tissue which resembled glandular structure. On opening the cyst a considerable quantity of dark fluid blood escaped, which contained a number of small, recent coagula. The inner surface of the cyst was uneven and reticulated, resembling the interior of the right ventricle. On the surface of the prominences, diverticula could be seen, which were in free communication with the principal cyst. The wall of the cyst was very much indurated and thickened at four or five places. Some of these nodules were fibro-cartilaginous in structure, while others had undergone calcification.

Sections of the cyst wall showed under the microscope nucleated epithelial cells which resembled in structure the epithelial cells in the pancreas. Acinous groups of glandular tissue were also found. The reticulated structure in the interior of the cyst contained vessels and remnants of the acini. The author came to the final conclusion that the tumor was a cyst, located in the tail of the pancreas. The presence of blood in the cyst was explained by the supposition that, during the progressive dilatation of the cyst, some of the vessels in the connective tissue reticulum had ruptured.

M. Le Dentu, who examined the cyst, also came to the conclusion that the bleeding had taken place into a preëxisting cyst. What symptoms the presence of the tumor had produced during life could not be ascertained, as the patient was being treated for organic disease of the heart and the tumor was not recognized during life.

CASE II.—Störck (*Archiv gén. de Paris*, Mai et Juillet, 1836) observed the following case. The patient was attacked during the menstrual period by vomiting, which was followed by coldness of the extremities, palpitation of the heart and dyspnœa. Soon after this time a pulsating tumor was detected in the epigastric region, which caused considerable pain. The patient also suffered from constipation and attacks of vomiting.

She died three and one-half months after the first attack. At the autopsy the entire pancreas was found enormously dilated, and weighed with its contents thirteen and one-half pounds. On cutting into it, it was found filled with coagulated blood. Judging from the condition of the coagula, bleeding had occurred at intervals. The weight of the tumor had caused injurious pressure upon adjacent organs. Le Dentu believed that the hemorrhage was caused by the act of vomiting and had taken place into a preëxisting cyst of the pancreas.

CASE III.—John Parsons reports a case where hemorrhage into a preëxisting cyst proved fatal after the latter had ruptured into the intestinal tract (*British Medical Journal*, 1857). The patient was a female, sixty years of age, who had suffered from vague dyspeptic symptoms for an indefinite length of time. When she was examined by the reporter a fluctuating tumor the size of an orange could be felt in the epigastrium, just below the

greater curvature of the stomach. Emaciation progressed rapidly. The tumor disappeared suddenly, at the same time a viscid, dirty white fluid was discharged through the bowels. The tumor reappeared in a short time, and ruptured a second time into the intestines, followed by hemorrhage into the ruptured cyst which proved fatal. At the autopsy, the pancreas was found excavated into a wide canal which, at either extremity, was dilated into a cyst. The walls of the cysts were of the firmness of cartilage, and the organ was adherent to the stomach, kidney, and colon. Coagulated blood was found in the dilated duct and cysts.

REMARKS.—In Anger's case there is room for speculation concerning the origin of the cyst and the source of hemorrhage. As the cyst had not ruptured and did not remain in communication with the patent pancreatic duct on the proximal side, we can only explain the absence of altered pancreatic juice or at least the absence of cyst contents previous to the occurrence of hemorrhage, by assuming that absorption took place as hemorrhage increased, if we adopt the idea that the bleeding occurred into a cyst which had formed before hemorrhage took place.

Two other explanations might be offered. First, that the parenchymatous hemorrhage produced the cyst, the circumscribed coagulum separating the interstitial tissue, and the lining of this space with endothelial cells developed from the connective tissue cells, and subsequent hemorrhage from the interior of the cyst wall. Again, the hemorrhagic cyst might have originated in a dilatation of one of the vessels of the pancreas, a varicose ectasia of a vessel.

In the second case it appears more than probable that hemorrhage occurred by rupture of a vessel and extravasation of blood into the altered parenchyma of the gland, distending the entire capsule of the organ—in other words, a hæmatoma of the pancreas. In Parson's case the clinical history and the post-mortem appearances prove beyond all doubt that the fatal hemorrhage took place into a preëxisting pancreatic cyst. The immediate cause of hemorrhage in this case was undoubtedly due to inflammatory changes in the interior of the cyst after the first rupture, and to sudden diminution of intracystic pressure by the second rupture.

Diffuse Hemorrhage.

CASE I.—Reported by H. Hodson Rugg (*Lancet*, May, 1850). A man, aged forty-two years, had just recovered from an attack of acute articular rheumatism, when he was attacked suddenly with a severe pain in the left lumbar region. He became collapsed almost instantly. This was followed by cold, clammy sweat and other symptoms of acute anæmia. He never rallied, and died within a few hours. On opening the abdomen after death a large quantity of recently extravasated blood was found between the pancreas and left kidney. A careful search for the source of hemorrhage was made, when it was found that the blood had escaped through an opening of considerable size, which presented the appearance of an ulcer on the anterior surface of the pancreas, which contained a blood-clot of the size of a walnut. Sections

through the pancreas showed a number of small excavations filled with blood, the size of a hazelnut and smaller, which looked like aneurismal dilatations.

CASE II.—Reported by Oppolzer (*Medizinische Neuigkeiten*, April, 1859). The patient suffered from severe pain in the epigastric region, followed by vomiting, which always aggravated the suffering. The vomited matter consisted of mucus and bile. The disease was attended by fever, very frequent pulse, cold extremities. The bowels were constipated. No blood was vomited, and the case was diagnosed as perforating ulcer of the posterior wall of the stomach. On the third day after admission to the hospital he died. At the autopsy the stomach was found in a healthy condition, but around the pancreas and between the layers of the mesentery a copious effusion of blood was found. The pancreas was the source of hemorrhage. This organ was found enlarged to double its normal size, of dark red color, and on section was found infiltrated with a blood-stained exudation into the acini.

CASE III.—Reported by Hilty (*Correspondenzblatt für Schweizerärzte*, Nov. 15, 1877). The patient was a mechanic, aged thirty; tall, stout, and muscular, but of intemperate habits. One evening he drank beer to excess, and on the following morning without any premonitory symptoms he was seized suddenly with a painful tension of the abdomen, which gradually increased in intensity. He was sent to the hospital, where, on examination, he was found in a collapsed condition. Extremities cold, forehead covered with a cold, clammy perspiration. All the symptoms indicated acute anemia. On physical examination nothing abnormal was found, except that the upper part of the abdomen was distended and painful, especially to pressure. Diagnosis of poisoning or gastritis was made, and treatment adopted in accordance with this view. The patient never rallied, and died on the evening of the following day. At the necropsy the omentum and mesentery were found loaded with fat. No abdominal effusion and no trace of peritonitis. The diaphragm was pushed upward as high as the fourth rib. In the connective tissue around the pancreas a copious effusion of blood was found. The pancreas was double its normal size, firm in structure, and of a dark violet color. On section the lobules were seen to be of a dark color, and the interlobular tissue infiltrated with blood; this infiltration was most copious in the head of the organ. The gland duct was normal, but the vein running along the lower border of the pancreas was distended with blood-clots. No other pathological conditions were found which could explain the sudden death.

CASE IV.—Described by Portal (*Traité de l'apoplexie*, Paris, 1811). This is the first case of this kind on record. A merchant had suffered for two years from colicky pain in the abdomen, nausea, and diarrhœa; emaciation appeared early and continued progressively. Twenty days before his death fever made its appearance. The pancreas presented a violet color, was softened, and from its whole surface was exuding a black offensive fluid. Stomach and duodenum showed at some points adjacent to the pancreas evidences of inflammation.

CASE V.—Reported by Haller and Klob (*Wiener Zeitschrift*, N. F., 11, 37, 1859). Patient was a man, sixty-six years of age, who had died after a short illness. The pancreas was found almost completely detached, its only connection with the adjacent organs being a few strings of connective tissue. It was surrounded by a serous fluid. The stomach was perforated from without, and the cells of the pancreas were disintegrated, granular, and changed into detritus, and the splenic vein was filled with a thrombus.

Kollman (*Bayr. ärzt. Intelligenzbl.*, No. 39, 1881) reports two cases of hemorrhage of the pancreas, the first of which came under his own observation, and the second under the care of Gerhard.

CASE VI.—Female suffering from stenosis of mitral valve and pleuritis on left side. One afternoon, after having partaken of a liberal dinner, she had an attack of diarrhœa, but no vomiting. During the night she had a chill,

and an anxious sensation with jactitations. In the morning of the following day she felt greatly improved, but soon after expired suddenly.

Autopsy. Subperitoneal extravasation of blood at the pyloric end of stomach. Mucous membrane of duodenum along the convex side infiltrated with blood, but intact. Pancreas hyperæmic, and surrounded with an extravasation of blood, which was most marked in the retroperitoneal connective tissue, extending to the hilus of the spleen. The tail of the pancreas was more hyperæmic than the remaining portion of the gland, and infiltrated with blood.

CASE VII.—The patient was a female, who, from the symptoms presented, was supposed to suffer from bronchial catarrh, emphysema, ascites, and anasarca. She was suddenly seized with collapse, and died in a few hours. At the necropsy the subperitoneal tissue of the duodenal peritoneum was suffused with blood. Considerable hemorrhage into pancreas, and the retroperitoneal space behind pancreas distended with blood.

REMARKS.—A careful perusal of the above cases must satisfy the most casual observer that the hemorrhage was produced by different causes, and constituted simply an expression of different pathological conditions. In the material presented three distinct, primary, pathological conditions will be recognized: 1. Disease of the bloodvessels of the pancreas; 2. Chronic parenchymatous degeneration of the gland; 3. Acute hemorrhagic pancreatitis.

In Rugg's case the patient had just passed through the stages of acute articular rheumatism, and had not suffered from symptoms referable to organic disease of the pancreas, when he died suddenly from internal hemorrhage, which was traced to the pancreas. The pancreas itself showed no other pathological changes, except circumscribed cavities filled with blood, which are referred to as resembling aneurismal sacs.

Case No. III., reported by Hilty, is an illustration of the second class. Extensive fatty degeneration was found to exist in the tissues generally. Klob found interstitial hemorrhage in the pancreas, in connection with chronic interstitial inflammation of the pancreas, and as a result of prolonged congestion of the portal vein. Zenker reported three cases, which he observed in the course of one year, to the Naturforscher Verein at the Breslau meeting in 1875. In all cases the amount of blood extravasated was slight. His observations on hemorrhagic infiltration of the pancreas as a cause of sudden death are of great importance to the medical and legal profession. Death from this cause takes place more frequently than is generally supposed.

The facts observed by Zenker were nearly the same in all cases. A corpulent subject died suddenly, or was found dead. Post-mortem examination revealed, as the only tangible pathological change, hemorrhagic infiltration of the pancreas and neighboring connective tissue, and advanced fatty degeneration of the pancreas.

Further, there was found in two cases bloody effusion in the duodenum, and in two excessive engorgement of the semilunar ganglion. Zenker

believes that paralysis of the heart, whether directly or indirectly caused, must be regarded as the immediate cause of death in these cases. Diffuse infiltration is more common than circumscribed, showing that the same cause exists throughout the entire gland. The bloody effusion is usually not limited to the capsule of the gland, but infiltrates the adjacent spaces, more especially the retroperitoneal connective tissue. The gland is softened, the anterior serous covering disorganized, and the extravasated blood escapes into the bursa omentalis. These conditions are followed rapidly by death, so that even the peritoneum does not show any secondary changes.

In the last class of cases, where the hemorrhage occurs as a symptom of a peculiar and exceedingly malignant form of inflammation of the pancreas, we have reason to believe that the cause of the inflammation is due to the presence of a specific form of infection. Klebs believes that in these cases the corroding qualities of the pancreatic secretion may induce the destructive process. Reasoning from analogy, it is, however, probable that the immediate and essential cause is to be found in some form of microbic infection.

The last two cases illustrate that prolonged congestion of the abdominal organs from obstruction to the return of venous blood, may act as an exciting cause in producing parenchymatous hemorrhage into the pancreas altered by antecedent pathological conditions.

The premonitory symptoms which precede the hemorrhage are referable to the particular kind of tissue changes in the pancreas which predispose to rupture of the bloodvessels. In all instances of pathological hemorrhage we have the usual train of symptoms which point to the textural changes in the pancreas as the seat of lesion. Loss of appetite, nausea, vomiting, epigastric pain, constipation, and debility are the most prominent symptoms in cases of degeneration of the pancreas. When the hemorrhage takes place in the course of an infective, hemorrhagic pancreatitis, we have a complexus of symptoms indicating the presence of an acute inflammation of the organ, usually attended by a rise in temperature. In some cases the hemorrhage produces death so rapidly, that the symptoms which attend this occurrence are of such short duration, that it has been impossible to determine them by actual observation. When the patient dies from loss of blood, the accident is announced by the well-marked symptoms indicative of external hemorrhage: a sharp pain in the region of the pancreas, followed almost immediately by collapse, cold extremities, absence of pulse, cold, clammy perspiration, and a speedy death. If hemorrhage takes place into a pre-existing cyst, the presence of which has been previously determined, the accident may be suspected if pain is suddenly increased, the tumor

becomes larger and more tense, and more particularly if the patient's condition indicates a sudden increase of anæmia. Physical examination can be of value only if hemorrhage occurs into a preëxisting cyst of considerable size, or if the effusion of blood is sufficiently copious to give rise to an appreciable swelling in the immediate vicinity of the pancreas.

The propriety of surgical treatment of pathological hemorrhage of the pancreas can only be entertained when the accident takes place in consequence of circumscribed, benign, pathological conditions which in themselves do not jeopardize the life of the patient, and which admit of measures for arresting hemorrhage by direct treatment. Operative interference should, therefore, be limited to the class of cases described under the head of hemorrhagic cysts of the pancreas. In well-defined cases belonging to this group, it would be justifiable to resort to abdominal section as the only means of arresting fatal hemorrhage, by direct ligation of the bleeding points, or by removing such localized portions of diseased tissue from which the hemorrhage has taken place.

For instance in Case I., partial excision of the pancreas in which the ectatic vessel had ruptured, would have definitely arrested the hemorrhage without interfering with the physiological function of the remaining portion of the gland. When profuse hemorrhage takes place into a preëxisting cyst of the pancreas, further hemorrhage can be effectually arrested by establishing an external pancreatic fistula of large size, plugging the interior of the cyst with iodoform cotton, and applying firm elastic compression of the abdomen with a rubber-webbing bandage over the antiseptic dressing. If this procedure should fail to arrest the hemorrhage, the abdominal incision should be enlarged and an attempt made to extirpate the cyst with or without resection of that portion of the pancreas from which the cyst has grown, according to the size or location of the cyst.

In diffuse hemorrhage of the pancreas due to localized lesion, the same treatment is applicable as advised in the treatment of hemorrhagic cysts of the pancreas.

(To be concluded.)

CASTRATION IN MENTAL AND NERVOUS DISEASES.

A SYMPOSIUM

BY

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CASTRATION, in the wide sense of the word, both of the male and female, has an import which attaches to no other surgical operation. It not only puts in jeopardy the life of the individual on whom it is performed, but it involves the certainty of the non-production of the whole series of beings that might result from man's obedience to the first command of his Creator, "Be fruitful and multiply." Its potential fatality, as regards the subject of it, sinks into insignificance when compared with the absolute extinguishment of one line of the species. Hence its gravity among moralists, and the severity with which it has been visited by legislators. Death and penal servitude for life, without remission, are the punishments set by some codes upon the crime of unjustifiable castration; which term is made to include all mutilations that may put an end to the virility or fecundity of the victim.

The duties of a surgeon often lead him near the confines of what is illegal. With the deceptive plausibilities of patients, their indefinite notions of morality, and his own propensity to action, induced by sympathy with distress, the balance of prudence is sometimes apt to waver in uncertain hands. One is thus brought to see how indispensable strict ethical training is as the complement of technical education, how needed is a check upon the impulses of acquired or reputed manual dexterity, how, in reference to laparotomy operations in general, the profession should be made to feel that it is acting under the restrictive influence of the opinions and decisions of its wisest and most vigilant leaders, and how urgent it is that those leaders should rise to the level of their dignities and responsibilities.

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The advances made in abdominal surgery within the last five and forty years are, to those who have passed a long life in practice, who have been sharers in the work done, and who have found time to look about them and note what their contemporaries have undertaken, something astounding. Men of to-day, launched upon the full flood, have little idea of how the rush of accumulated experience which carries them along has been made up; or of the struggles and perplexities those who were the first to move had in paddling and steering through the swamps of difficulties, and in face of the blasts of prejudice. Progress was slow and there was time for reflection. It is not to be wondered at that such reflection sometimes caused hesitation and yielding before obstacles. Cooper, Lawrence, Green, Brodie were great surgeons. They did and taught surgery that was the boast and honor of their day. But they were orthodox men; they revered authority, and were authorities themselves. A pause for inquiry as to what was going on, and where it would lead to, was, at their suggestion, not dishonorable and did good service. It helped to enlighten and liberalize them, and it moderated the contagious impetuosity of the new adventurers. It would not be unwise if we made a halt now, and took account of our position in regard to some points that are pressing and open to question. We may be among the last to stand in the way of clear-sighted attempts to move onward, but wish always to be guided, and to see others guide themselves, with caution and in the light of reason.

This is not the place to go into the history of ovariectomy. But it may be well to recall some points in it connected with the subject before us. In its early days the operation was looked upon as a personal enterprise, to be taken up every now and then by men of the Livingstone, Brunell, or Columbus type, who were either vaguely enthusiastic, stimulated by an impulse for out-of-the-way performances, or so wise and so far ahead of their times that few could understand them; and fewer still were inclined to follow an example which, though it might meet with a certain amount of success, excited astonishment and suspicion more than admiration, and brought little other reward than the consciousness of having made honest efforts to rescue suffering women from impending death. Then came a time when things were different. The profession took up the matter seriously and practically. It was still an assault upon unsolved problems. But the contention ended in the opening up and annexation of the "whole domain of peritoneal surgery." It was like the discovery of the Californian diggings or the African diamond fields. The way was cleared for all prospectors, and the benefits spread world-wide. Between the years 1840 and 1865 the excision of ovarian tumors came to be accepted as a sound piece of surgery, as admissible among the arts "*quæ prosunt omnibus*" as lithot-

omy, and more promising in its results than most other capital operations. It became naturalized in England, was taught in the schools, and soon threw out an abounding crop of controversial and didactic literature.

But there was a reverse to this bright side of things. Inexperience, rashness, maladroitness threatened danger. I saw then for ovariectomy, as we now see for laparotomy, a disposition to wild, irreflective meddling. In my book, published in 1865, I seem to have anticipated something similar to the present folly, though not nearly to the extent it has now gone. Here is what I say in the preface: "I cannot send forth this volume without a word of caution. A discovery which has triumphed over opposition of all kinds, honest and scientific, prejudiced and ignorant, may still be ruined by the support of rash, inconsistent, thoughtless partisans, whose failures do not reflect so much discredit on themselves as on the operation they have badly performed in unsuitable cases. Indications are not wanting that ovariectomy has entered on this phase of progress, and there is reason to fear that judicious men may be influenced by the outcry of the foolish, and that a triumph of British surgery, which has been won by such great labor and care, may be arrested before it is complete—may even be converted into temporary defeat—by the indiscriminate support of zealous but injudicious advocates." We are not wrong in assuming that such warnings—for mine did not stand alone—were not useless. More discrimination was shown in the selection of cases, diagnosis was more scrutinizing, operators fitted themselves better for the work by reading and observation, and both unsuccessful operations and incompleted attempts became less frequent.

But ovariectomy was not only viable and strong. It had in it an unsurmised power of fecundity which we can now estimate by the many prefixes to its terminal dissyllable. Before the present reign, the art of midwifery was somewhat in the shade. The needs of royal maternity gave it the prestige which was wanting to its utility. Knightly spurs and hereditary rank were won in the palace chambers. The title was a little incongruous with the old familiar term midwife. The synonymous accoucheur came into vogue, but it did not accommodate itself to the linguistic requirements of professors and writers, and was objectionable as being imperfectly euphemistic and too directly artistic. Something with a more scientific twang was the desideratum, and obstetrician seemed for a while to be all that could be hoped for by those who were ambitious of showing that they could propound doctrines as well as handle forceps. Yet women, whether in the hands of Shandean Slops, or Caxtonian Squills, are not always as they should be, either before or after the great obstetrical event. They have maladies before, meet with

accidents at the time, and often suffer consequences which require surgical skill for their cure. Some could split a perineum, but it was not every one who could put it right again, and obstetricians soon began to foster a competition for secondary specialties, to indulge in the creation of Greek compounds, and were not long in fitting themselves with the distinguishing appellation of gynecologists. Gynecological societies were the inevitable complement of this sectarianism, and in their proceedings we find all their speculations and manipulations so put in evidence that we can leisurely watch and criticise them in their budding, blooming, and fruition.

The growth of specialization in medical science is at the same time a benefit and a peril. It is well to know that men of broad culture, capable of linking each small and special area of research to, and viewing it in the light of the vaster realm in which it is an essential and inalienable factor, devote themselves to particular investigations. And if special gatherings were schools of instruction by masters, instead of theatres, with rapidly recurring exhibitions of curiosities and recitals of marvels, which must be made forthcoming by some means at the appointed time, we could appreciate them. There is a wide difference between one man acting and ruling as a specialist, and a miscellaneous lot of men grouping themselves together and each pushing to the front as a society of specialists. The master of a pack of hounds must be a specialist in his way, but it would be absurd to suppose that every rider in the field would be able to take his place, or any other than that of a follower. But herein is the danger with groups of gynecologists. It would not answer for all to run on in the same track. To be anything, each must hunt up his own little therapeutical quarry and keep to it. Groping among details is an absorbing and paralyzing occupation, and soon the curve of a pessary or the lining of a speculum fills the field of vision, and great principles are lost sight of. With one such idea kept steadily running in the same groove, a man may quickly find his way down to the lowest level of routine womb-scaffolding or singeing. And so it is that while out of the multitude of gynecologists a few inspired with Hunter's idea "all discord, harmony not understood," are spending their lives in the higher regions of speculative inquiry, thinking, developing ideas, multiplying original principles, and applying them to the pathological phenomena peculiar to the female sex—with a special view to the elucidation of their causes, mode of origin, and prevention—the rest are dispersing themselves over the lower ground of therapeutical action. Disease exists, the how and the why concern them not. Why search into the inscrutable? If the faults and follies of mankind engender excisable matter, their business is with the palpable, and to get rid of it. So myomotomy follows ovariectomy, Porro supplants the

Cæsarean, Battey breaks through his difficulties with "normal oöphorectomy," and the *Moutons de Panurge* are soon seen flocking over his gap. It is with this castration that we have to deal.

It is about fourteen years since the operation of normal ovariectomy, as Battey called it, was brought practically before the profession. It is now impossible to ascertain how often, or by how many surgeons, it has been done. But the most recent bibliography of the subject extends to about five octavo pages, and comprises the names of more than one hundred and fifty writers. The greater part of these publications consist of the accounts of cases and the discussion of points of practice. Some of the matter is critical, much of it defensive and exculpatory. So that it has both a history and a literature.

The operation itself is in no sense a novelty. It has been practised in all times, though not for surgical reasons. In the last century, about the same time, L'Aumonier and Pott did it remedially; the first, without premeditation in the course of opening an abscess in the iliac region. Pott, however, intentionally took away two ovaries which formed inguinal hernias. Though Blundell never did the operation, it would be unjust to omit all reference to his so often cited prophetic suggestion, made before the Medico-Chirurgical Society, in 1823. Lassus, in 1858, and two German writers, mention some other cases similar to that of Pott. In 1869, Kœberlé, while putting a ligature on the broad ligament for the relief of a retroverted uterus, took away an ovary which embarrassed his proceedings. Esmarch, too, a little while later, removed both ovaries from a young woman who had congenital atrophy of the vagina. The monthly sufferings were so great that each time her contortions forced the ovaries through the inguinal openings. They were the point of departure of all the neuralgic radiations, and Esmarch cut them away as a dentist would draw a troublesome tooth, without theorizing about the suppression of function and anticipated climacteric. He simply did a perfect castration and left the titular honors of normal ovariectomy, or oöphorectomy as it was soon after called, to Battey, and to Hegar, who began to use the phrase "castration of women."

These two surgeons, in July and August, 1872, within twenty days of each other, did the operation of castration by the abdominal section. One was at Fribourg, the other at Rome, in Georgia. Of course, they knew nothing of each other's reasonings and actions. Both their patients were in much the same condition, with menstrual neuralgia. Hegar's patient died of septicæmia, and he held his hand for four long years. Battey had a better chance. His patient got well and was quit of her troubles. Elated by the success of his operation, he hastened to make known what he had done by a notice in the *Atlanta Medical and Surgical Journal*, the September following, and six months after-

ward gave all the details of his performance, and defended his theory, before the Medical Society of Georgia. Both men had the same idea, or nearly so. Esmarch's object was nothing more than the removal of the organs that were the seat or the cause of pain in his patient. It was a question of function and constitutional effects with the two pathologists. Hegar, from the first, explicitly stated that what he hoped to do by castration was to bring about a suppression of the ovarian function, a cessation of the periodical and intermittent influence of the ovaries on the whole system, and an early declaration of the menopause. Whether Battey went as far and was as clear in his conception of the import of the proposal has been doubted. He had taken a long time—six years—to deliberate and to consult about it, and met with nothing but indifference and disapproval. His arguments brought no one over to side with him. It was said that his idea was merely that of calming down pelvic disturbance, without calculating upon further consequences; but he distinctly mentions that he expected a "change of life" to follow the castration. If he did not argue out the matter, and expound his doctrine, with German elaborateness, we may at least admit that he knew what he was about and had considered what was likely to happen. At any rate, he thought out his subject carefully, acted independently, and was the first known to do so. He was prudent, waited patiently, and watched assiduously for a fair occasion to put his proposal to the test, and at last succeeded in showing it to be logical, rational, and effectual in practice. If his arguments had made few converts to his opinions, his practice was soon adopted by followers, and he is entitled to the credit of originality.

Up to this time we had heard only of menstrual difficulties as a motive for oöphorectomy. The ovaries were treated as confirmed and convicted culprits. Battey seems to have spent as much as six years in reformatory efforts with his first case. It was only when all looked utterly hopeless and incorrigible that the extreme penalty was resolved on and carried out. It was a sorry alternative, and not one to boast of. When a surgeon is obliged not only to put on the black cap but to become the executioner, the only redeeming point in the business is the skill he may display in carrying out the sentence. The blot is the necessity for such a measure. As society is wanting in reference to crime, so the profession is wanting in reference to disease. There is too much law, and not enough gospel; too much doctoring and not enough philosophic pathology. It might be otherwise. With better principles and training we should see less of crime and its consequences. With a keener estimate of the higher functions of medicine, more thinking, more research and systematic dialectical reasoning, there would be more defiance of disease, more life-giving power, and less of surgery. But we

are not yet at this point, and dysmenorrhœal invalids may in the meantime be thankful that there are still some oöphorectomists as considerate and merciful as Battey.

The year 1872 was remarkable in that, within a month of each other, three oöphorectomies were done by three different surgeons, in three different countries, without either of the three being aware of what the others were about. We have noticed the operations of Battey and Hegar. On the first of August, a few days after Hegar's operation, Tait, of Birmingham, is reported to have also removed two ovaries from a woman who was sinking from irrepressible hemorrhages due to uterine enlargement or tumor. She recovered and was better two years afterward. In the course of the next year it is also recorded that he did three more similar operations. In two of the cases he took away only one ovary. That was imperfect castration—not the complete operation of Hegar. The want of appreciation of Hegar's motive for the operation is evident. Of a large proportion of Battey's early operations, the same defect is also apparent in the tables. It would seem that he too had failed, from some unexplained reason, in fidelity to the principle upon which all rests.

Gillmore and Pallen, Americans, did the bilateral operation in December, 1872, with success. In the next four years many other names came upon the lists, as Peaslee, Trenholme, Goodell, Sims, Thomas. These for the most part followed Battey's example, and at the beginning operated on patients with ovarian neuralgia and general nervous symptoms, or with some congenital imperfections interfering with menstruation.

Then, in 1876, Trenholme did as Hegar and Tait had done, and used the operation for hemorrhage, depending upon uterine fibroids. Later on, operators found all sorts of pretexts for operating. Too many of their operations were imperfect. Of eleven operations done by Sims, between February, 1875, and August, 1881, six were unilateral. Nor was the mode of operating determined; some choosing to do the removal by the vagina, others by the abdominal section. At length, in 1881, Battey, deploring the abuse of his operation, when at the International Congress held in London, felt himself constrained to renew his protest, and record the fact that up to that date he had met with only fifteen cases in which he could see reason for carrying out the practice.

It was not until 1876 that Hegar, in Germany, recommenced operating. In August of that year, he removed the ovaries from two women who had hemorrhagic fibroids. Both were saved and benefited. Kaltenbach then, in the following October, operated under the same conditions, but his patient died. Nussbaum had a success the same year. Between that time and 1879, Martin, Freund, Fehling, and Tauffer

castrated several women, mostly for fibroids that could not be otherwise treated. The idea in Germany was that as Hegar pointed out; this was the most legitimate use of the operation. Tauffer and Langenbuch thought the practice might be extended, and operated in some instances in which the dysmenorrhœa and other symptoms were manifestly of ovarian origin. But upon the whole the influence of Hegar's doctrines prevailed, and no such outburst as took place in America was seen in Germany. The reports of Wiedow, at Fribourg and Copenhagen, show how important have been the amount and success of oöphorectomy in uterine cases among the Germans. In Switzerland Bischoff, Bircher, and Müller took up Battey's notions and practice without hesitation. Since 1880 the operation has been accepted in Spain and Italy.

It is not the first time it has been said that there are some things which the French manage better than we do. And certainly in some gynecological matters it has been so. The logical faculty is strong in Frenchmen. It would almost seem that their women are not to the same extent as others liable to pelvic troubles. The subject of oöphorectomy had become repulsive from the fanaticism in America, and perplexing from some of the English revelations. Batteyism was on its trial and undergoing a process of classification. There was time to wait. *Fiat experimentum*—they could be content for a time with observations and reports. So things went on till 1880, when convinced of the rightness of the principle, and that the operation in the hands of judicious men was being turned to useful account, Professor Duplay operated in a case of fibroma, taking away both ovaries. His second operation was in 1884. Péan began in 1882 and has altogether reported eight operations. Three of his cases had congenital absence of uterus and vagina. The five others were neuralgic. Though, in general, abdominal sections are not popular among French surgeons, they are now carefully choosing their cases for oöphorectomy. The usages of French surgical practice render an epidemic of laparotomy very unlikely.

The operation was not at first well received in England. Tait, of Birmingham, has been identified with it from the beginning. He has modified it and extended its application. Many others have followed in his steps; some have tried to outstrip him. The ovaries and all their appendages now go the same way; and the meshes of the physical, mental, and moral network of reasons why the operation should be done are so closely woven that few cases of a perplexing nature, that can anyhow be connected with the generative organs or functions, have a chance of escaping laparotomy or something more. The present state of oöphorectomy in England proves how fully justified I was in writing as I did in 1882, and shows how little my warning has been attended to. I said then, and I have not a word to retract now: "Though I accept

the principle, I see that the operation has a very limited application, and is so open to abuse that its introduction in mental and neurotic cases is only to be thought of, after long trials of other tentative measures, and the deliberate sanction of experienced practitioners. . . . Except in cases where bleeding fibroids may call for the extirpation of the healthy ovaries, we might at least require some evidence of the ovaries being diseased before consenting to their extirpation in the hope of curing any of those vague nervous disorders to which women are so subject, which are often dispelled by moral treatment or social changes, often benefited by measures which can have but little effect except on the imagination, often return after cure in any way, and leave the hopeless beings the prey of unscrupulous or illogically enthusiastic experimenters."

The danger is now increasing as the operation is becoming world-wide. The oöphorectomists of civilization touch hands with the aboriginal spayers of New Zealand. The ovary, is in fact, the nucleus of gynecological science and the source of gynecological practice. Its products give occupation to the obstetrical art. The disturbances it sets up in the system at large are the prairie grounds of its proletarians. The morbid structural changes, displacements, and accidents of it and its appendages are the arena of its operators. Wonderful, indeed, is the hydra-like tolerance of women of sections and mutilations under their hands!

But the ovary is more than this. Reproduction is the dominant function of woman's life, and all her other living actions are but contributory. Physiologically and pathologically, the generative organs have peculiarities of which the surgeon must take account. They are not vital organs. The purpose they serve is more in relation with the species than the individual. Their life of functional activity is not of the same extent as that of the being of which they form part. The bodily health is none the worse, perhaps better, during the time of their quiescence. Disease is exceptional in them before puberty. The time of their activity is the time when they are most often attacked by disease. The origin of diseases in them which prove fatal after the change of life, may almost always be dated back to the middle period. They affect both the physical and mental powers and qualities during the time they are in development and full play; not much before or after. The tubes, womb, and vagina are accessories more or less essential. The ovary may exist without them; but it is seldom that the tubes, womb, and vagina are fully formed in the absence of ovaries. There may be an evolution of ova when the appendages are no longer there or are even cancerous. When the ovaries are diseased or removed function stops, and the other parts shrink up. None of the subordinate parts of the

passages can do what the ovary does, but the tubes may supplant the uterus as the seat of gestation, and the uterus, except during pregnancy, acts chiefly as a section of the tube. In infancy and old age its cavity is contracted and approaches nearer the form of the tube. There is a fact, too, which should never be neglected by the surgeon in coming to a decision about the operation of excision, especially in cases where the indications are not positive—to wit, that the ovaries are not such isolated organs, nor so invariable in their number, as is generally supposed. There, as elsewhere, is shown the tendency to revert to lower types of development; and patches of ova-bearing tissue may exist in adjacent peritoneal folds. These may be beyond the ligature of the pedicle; and, if left, keep up the sexual impressions and power of periodical ovulation. Liégois mentions this subject in his *Physiologie appliquée à la Médecine et à la Chirurgie*, of the date 1869. Waldeyer found a piece of ovarian tissue in the pedicle of a tumor after having, as he thought, finished an ovariectomy. Weigel counted, out of six hundred women examined, no less than twenty-three with more than the ordinary two ovaries. Instances of regular menstruation, and even of pregnancy, after double ovariectomy, have been met with sufficiently often to show how easy it is for the expectations of a surgeon to be thwarted by a condition which he can neither foretell nor determine exactly at the time of his operation.

The fact that women remain for some five-and-thirty or forty years with a certain part of their organization in a state of periodical excitement, ready for the special act of childbearing, would lead *à priori* to the supposition that the whole of that organization must in some way or other show the effects of it. And such is the case. At an early age females are more tenacious of life, and the mortality of boys is greater than that of girls. During the procreative period the excess is on the side of the females, independently of the mishaps of childbirth. After the climacteric, male deaths are in greater proportion. The disproportion in the number of the two sexes in the living population would be still more marked than it is, were it not for the casualties and diseases connected with maternity. There is a constitutional difference between the sexes at all times; but during the time when women are essentially females, they have more sensibility and excitability, a more lax and delicate fibre, with a strong tendency to nervous affections and diseases of an asthenic character. The development of puberty produces one set of disorders, usually anæmic; ovulation, parturition, and lactation give rise to another class; while nervous anomalies and degenerations of tissues mark the decline of the functions and the torpidity of the organs of generation.

So far as regards the many diseases, the relief of which by castration

has been either proved or postulated, we may virtually put children out of the question. They may occasionally require ovariectomy, but with that at present we have nothing to do. In one of the most recently published tables of oöphorectomies, the earliest age among the patients operated on for hemorrhagic myoma was eighteen, for ovarian neuralgia and hysteria seventeen, and she was none the better for it, and the youngest on the malformation list was eighteen.

Péan once castrated for epileptic symptoms with mental disorder at the age of 45, with no good result, and this is the most advanced age mentioned in the table of nervous patients. The age next below that was 40. 52 is the extreme age in the table of uterine cases, and the patient died some months afterward of cancer. It would thus seem that in all the older patients who submit to abdominal section, it is ovariectomy for cystic or other enlargement of the ovary that is done. Out of 171 cases undergoing the operation for hemorrhagic uterine fibroids, 53 were between 30 and 40 years of age, 62 between 40 and 50, and only 9 below 30. The number of cases of oöphorectomy for other causes is comparatively small, and few of them outside the middle age. The limits of our investigation of the diseases requiring oöphorectomy are thus drawn in within the narrow compass of the 20 years of woman's life between the ages of 30 and 50. The find here cannot, in the common run of things, be very rich except for fibroids. If the apostle of the doctrine could accept only 15 cases as fit for the operation in the space of ten years, we may assume that, in any great advance upon that proportion, there must be either some self-deception or some want of judgment.

During the twenty years just named, the most common disease to which women are subject, connected with the organs of generation, is an abnormal development of the uterine muscular or fibroid tissue, either interstitial, or projecting from one or other of the uterine surfaces. Such tumors occasion discomfort often so great as to incapacitate for social life. They are impediments to childbearing. They give rise to a variety of reflex nervous symptoms, sometimes almost insupportable. They may cause ascites or set up acute or chronic peritonitis, and dangerous hemorrhages are a notable consequence. Occasionally their pressure on the large vessels, nerves, lymphatics, ureters, rectum, and bladder has been fatal. And Roehrig declares that, among the cases bad enough to resort to Kreuznach, there has been a direct mortality of 11.4 per cent.

A disease against which stands such a formidable array of accusations calls for all the resources of science to remedy it. Although many women suffer less than can be easily explained, it must be the misery and ruin of a long series of existences. Medical treatment does not

count for much. The results of myomotomy are deplorable even now. And the operation, when not fatal, has often been incomplete. The tumors have, as it were, a sort of gregarious habit, and the patient is left liable to a relapse to her former state, either from the growth of those abandoned, or from new formations. Many writers have maintained that one out of every five or six women has uterine fibroids of some kind, large or small, unheeded or troublesome. Fortunately, if it be so, the greater part of them have only a transient existence. The numbers that turn up in a state of degenerescence or transformation in the autopsies of old women show that they have a tendency to shrink up, or become innocuous, if there be a survival of the menopause.

Based on this fact, castration, as compared with myomotomy, presents us with the striking contrast of a mortality of only 14.6 per cent., a diminution of the tumors, a stoppage of the hemorrhages and a disappearance of many of the accompanying symptoms. Moreover, as half this mortality has been due to septicæmia, there is here a wide field for surgical enterprise.

But the uterus is only a section of the ovarian outlet, destined for the temporary sojourn of the embryo. We have not exactly determined what are the influences on the constitution of the natural functions, and do not know much of the pathology of the strictly efferent part of the tubes—the oviducts or the Fallopian tubes. Sometimes they usurp the incubatory office. Then, no doubt, as death is otherwise mostly inevitable, the best thing to do is to extirpate them as soon as we can be assured that their condition is menacing life. But latterly they have had as sorry a time of it as the London dogs. They are erectile structures and blushed at the touch of the abdominal explorer. A cry was raised against them as subject to congestions, dropsies, constipations, purulencies, hemorrhages, neuralgias, and as the propagators of all sorts of psychical aberrations. Then followed a savage raid, and every hypogastric malaise incurred an exploration or a sacrifice. As with other tubes, the inlet, passage, and outlet are not always as free as they should be, and the contents are not always normal. Irritated themselves, they cause irritation elsewhere. As much may be said of and against similar things in the male. But would anyone strip off the penis for a stricture or a gonorrhœa, or castrate a man because he had a hydrocele, or was a moral delinquent. It is better to be candid and patient, say we know but little, strive to learn more, and in the meantime abstain from doing mischief. Who can diagnosticate with certainty the presence of irreparable disease in these out-of-the-way organs. An exploratory incision is an avowal of ignorance, and too often the expedient of impatience. How far is it justifiable as a means of diagnosis in diseases short of fatal, where there is time to wait?

A case of congenital malformation, with what is now sometimes called

obstructive dysmenorrhœa, ending fatally, under his care about the year 1866, was the inspiring cause of Battey's reasoning on the subject of the extirpation of the ovaries as a remedial measure. Gilmore was the first to put his conclusions to the test in reference to this particular point. Peaslee followed in 1876, and Battey in 1877. Battey had the satisfaction of a good result. So too it was with Gilmore's case. Since then the operation has been done for the same or similar reasons, so far as we can judge from the small numbers, with a mortality of about fifteen per cent. In this category of cases we may place obstructions to the menstrual functions acquired in severe labors, by accidents, by gynecological attempts at surgery, or occasioned by pelvic distortions, flexions, and displacements of the uterus. They are, after all, not very common, and oöphorectomy, as a means of getting rid of the difficulty, is less dangerous and more certain than the other operations done to relieve or gratify the patients.

The ovaries themselves are often the seat of pain, and the cause of acute neuralgia and hysterical symptoms. The attacks occur with the periodical excitement of the organ. Every now and then such symptoms show their connection with it by being the accompaniment to impregnation, and to some women the proof of conception. They often attend the early stage of growth of cystic disease. Repeatedly, a cessation of the attacks of pain has followed the operation of excision. This was the result in three out of four operations that I have performed. Cause, effect, and remedy are here plainly demonstrated. As to my two other operations, in one it was probable that the benefit was as much owing to the reposition of a thickened and retroflexed uterus as to the taking away of one of the ovaries, the other being in such a state of atrophy that it had no outlines, and was inert. In my fifth case the two ovaries had been amputated by surgeons of renown in Holland, at different times, without permanent benefit. At my operation there was no trace of another ovary, and what I did was to separate part of the omentum and a coil of small intestine from the uterus to which they were attached, and to divide another piece of omentum which adhered to both the fundus uteri and the cicatrix in the abdominal wall. Here the two castrations did no good. The liberation of abnormal connections near the seat of pain did what was wanted, and must be regarded as something more than the completion of the two oöphorectomies. All these cases had been discussed at repeated consultations among a number of experts; nothing was overlooked in the way of palliation, and no decision was taken without unbiassed deliberation. Even this small experience shows how this subject of operation for nervous dysmenorrhœa is surrounded with difficulties both of diagnosis and prognosis. In looking at the vast multitude of patients who come under professional notice, with a medley

of nervous or mental symptoms so tantalizing by their refractoriness and their inexplicability, we can understand how it is that many hasty, impressionable practitioners, exasperated by their fallibility, infatuated with novelty, enticed by example, and eager for local notoriety, have yielded to temptation, have risked numberless abdominal sections in the hope that chance would favor them, and so have helped to prove how strong is the contagion of folly.

When one recollects how many such cases undergo an unaccountable spontaneous cure, how often the symptoms cease after some mental impression or physical shock, or a perseverance in some extraordinary position, how many fruitful but painful ovaries have been saved by Dr. Weir Mitchell's systematic treatment, and how often it has happened that a threatened, simulated, or imperfect operation has been enough to frighten or charm away all acquaintance with suffering, doubt falls upon both the asserted necessity and the reputed success of the operation itself. It can never be determined how much is due to the amputation, how much is a psychical phenomenon. How many women have been doomed to sterility that would have been equally relieved by a farce or a failure, can never be made out. But it is a query which takes the gloss off a mass of statistics.

Still we do not pretend to say that cases of nervous dysmenorrhœa, with neuralgic hysterical symptoms, are not occasionally to be met with in which medication fails, and for which there is no other alternative than operation or endurance. But we maintain with Battey, Duncan, and many other wise and prudent men, that such patients are comparatively few and far between. And it is only when one hears such well-authenticated, revolting stories as that of a young lady who, in good health, leaves her home, goes to London or some provincial town, happens to have a trifling indisposition, consults —, who, troubling himself only to draw out the avowal that her periods were accompanied with "*quelque malaise*," on the spot insists upon oöphorectomy, and a few days afterward does it, that the mystery of some recent statistics is unveiled. Fortunately, she lived to return and tell what had passed. If she had died, what ought to have been the verdict? Have early or later warnings been illtimed or impertinent?

No one can pique himself upon the outcome of oöphorectomy for mental alienation. A few melancholy girls, worn out by long suffering, and driven to think of the river by disappointment at the abortiveness of doctoring, may have laughed and found life tolerable afterward; for women are not morally affected by castration in the same way as eunuchs. But pure madness—no; gynecologists will never empty the lunatic asylums. They have sent some women into them. Madhouse dissections show generally only good or atrophied ovaries, and scarcely in any real ovariectomy cases have the patients been mad.

The pleasantries of men we do not care to name, who talk of freeing the world from the mad and the bad, only point to the extinction of the human race and the self-castration of the last man—for he who cuts mad people must himself be mad. And as for nymphomania, one operator put his own person in danger when he counselled so inconsequently. He must have known that passion in women mocks at oöphorectomy, and his illogical reasoning condemned his judgment. Call a spade a spade, and what would such oöphorectomists be?

The erotic fury and bad habits which mark the ill-regulated mind are matters more for the consideration of the moralist than the surgeon. Parents, tutors, and the clergy ought to be the guides and protectors of youth. The profession can only act by instructing them. No one has more wisely handled this subject than Wheelhouse, the worthy consultant of Leeds, nor can any one do better than recommend his pamphlets and quote the concluding sentences of one of them :

“If medical men will teach parents the true nature of the dangers to which, when they leave their fostering care, their children will be exposed—

“If parents, acting on the knowledge thus imparted to them, will conscientiously fulfil their duty to their children—

“If those to whom the education of the young is entrusted will see that ignorance is displaced in favor of wholesome knowledge—and that, as far as possible, purity of mind, as well as intellectual culture, are the objects at which they should aim, then I think all else will rest with the clergy—and that they, by their positive teaching of the essential holiness of God, with the perfect, spotless character of Christ, as the revelation of the pure nature of the Deity—and as the measure of our own high calling, may rightly be left to inculcate these as the strongest of all moral antiseptics.”

The following are the conclusions that may be drawn from the facts at command :

That the operation of oöphorectomy, or the removal of normal ovaries, is one which may be advised in some cases of uterine fibroids, and in uncontrollable uterine hemorrhages.

That it is to be resorted to in certain malformations of the genital organs, deformities of the pelvis, and accidental obstructions of the vagina.

That the right to use it is very limited in cases of ovarian dysmenorrhœa or neuralgia, and only when they have resisted all treatment, and life or reason is endangered.

That in nearly all cases of nervous excitement and madness it is inadmissible.

That it should never be done without the consent of a sane patient, to whom its consequences have been explained.

That the excision of morbid ovaries and appendages should be dis-

tinguished from oöphorectomy, and ought not to be done without the authority of consultation, as in most other cases of abdominal section.

That in nymphomania and mental diseases it is, to say the least, unjustifiable.

Professional reputation is a sacred trust. Generations have handed down that of physic unsullied. To maintain it is with us a personal obligation, and our individual responsibility is now greater than ever. There is so little scope for concerted action in medicine, that the popular estimate of it must be an *ex pede* estimate. Medicine has none of the symbolical trappings of state authority or of celestial inspiration which tell upon the fears and superstition of the people. It is hope that makes them seek and cling to it as their first refuge in time of trouble. It is with them, in their homes, their guide and comforter. People pay little heed to presidents and rectors. The village doctor represents the profession to them, and each in his little circle is high priest and chancellor. By his skill and conduct the whole faculty is judged. He is like one of the fragments in a mosaic. If he is unsound, goes wrong, fails in fidelity to the *lex non scripta* of his class, he falls from his place, leaves a blot which all can see, and the whole composition is marred. In the exercise of his profession each member is so independent, while all are so linked together in honor and duty, that, as sentinels, we have a mutual interest in keeping watch and ward over each other's loyalty, and sounding an alarm in case of default. Of late, the laparotomy epidemic has called for one of these challenges. It has roused a feeling not of jealousy, but of suspicion and concern for professional honor. When men in clubs begin to jeer at gynecological domiciliary fussiness, and husbands are furious at the rumors of mysterious diseases, unknown to Sydenham and Cullen, being rife among their wives and daughters, there must be something wrong. It is time to look into the matter. If we hold the mirror up to nature, only changing the sex of the actors, the spectacle is not flattering. Fancy the reflected picture of a coterie of the Marthas of the profession in conclave, promulgating the doctrine that most of the unmanageable maladies of men were to be traced to some morbid change in their genitals, founding societies for the discussion of them and hospitals for the cure of them, one of them sitting in her consultation chair, with her little stove by her side and her irons all hot, searing every man as he passed before her; another gravely proposing to bring on the millenium by snuffing out the reproductive powers of all fools, lunatics, and criminals; a third getting up and declaring that she found, at least, seven or eight of every ten men in her wards with some condition of his appendages which would prove to be incurable without surgical treatment, and a bevy of the younger disciples crowding around the confabulatory table with oblations of soup-

platefuls of the said appendages; if too, we saw, in this magic mirror, ignorant boys being castrated almost impromptu, hundreds of emasculated beings moping about and bemoaning their doltish credulity, showers of cases, ready for cutting, falling like manna, every morning, at one spot, while in another they drop in at the rate of one and a half the year,—should we not, to our shame, see ourselves as others see us? And if at the same time we were to hear a few of the sisterhood, more frightened than shocked, muttering remonstrances, and crying out like the Ephesians of old, that their craft was in danger,—say, should we not be bound to enter the strongest protest against their selfish wailings, and indignantly to denounce such follies as a personal degradation, a crime against society, and a dishonor to the profession?

T. SPENCER WELLS.

WE understand by the term “castration” the removal of normal or degenerative ovaries, not, however, including those which have developed into large tumors. The results of such extirpation are: (1) Amenorrhœa, (2) shrinking of the uterus and of the tubes. Exceptions are rare, and have their special causes, as, for instance, incomplete removal of the organs and inflammatory conditions; experiments on animals accord with those results. The uterus and Fallopian tubes in young animals do not develop, or may even undergo atrophy when the operation is performed in later life. The “rut” does not take place, or it vanishes if it has already appeared; moreover, this rule has individual exceptions, which, just as in human beings, find their *raison d'être* in special conditions, as, for example, in cases of “perlsucht.” Defect or rudimentary development of the uterus and amenorrhœa constantly accompany congenital deficiency or the rudimentary development of the ovaries, so that by this the dependence of uterine development and of menstruation on the ovaries is demonstrated. Also, the diminution of the uterus at the climacteric appears to be occasioned by the cessation of ovulation.

These facts are undoubted; on the other hand, we know little of the influence which castration exerts on the body as a whole, and on the nervous system. The investigations of Puech have aroused very serious doubts whether the female type of configuration, the development of the breasts and of the external genitals, the tone of the voice, the peculiar mental tendency and mode of thought of the female are closely connected with the presence of the ovaries. At any rate, the complete female type has been observed in women who have a congenital defect of these organs. Castrated animals show a greater inclination to the laying on of fat, but not after a morbid manner, but more as a co-phe-

nomenon of good general nutrition, even though no special mode of feeding is employed. This has also been observed often in spayed women. A quieter temperament is noted by veterinary surgeons as a further consequence, and is brought into connection with the cessation of the rut. A curative effect can be obtained by castration in two ways: either we remove the degenerated ovaries, the tubes, and accessible portions of the broad ligaments, because these structures *per se* provoke the pathological phenomena, or we extirpate both germinal glands, in order to use the influence of the climacteric period, viz., the suppression of ovulation, for the cure of certain local diseases of the sexual canal, especially of the uterus, or of certain general disorders and nerve affections.

Diseases of the ovaries and tubes, small cystomata, dermoid cysts, fibromata, follicular cystic degenerations, tubo-ovarian tumors, pyosalpinx, and others, may determine very considerable troubles and suffering, and among these, also, serious nervous derangements. The extirpation of such structures stands on the same footing as the removal of any other part of the body which has become useless and degenerate. The greater danger which is induced by opening the peritoneal cavity, is the only thing which makes a difference, so that we have to weigh carefully the injurious effects of the existing disease against the danger of the operation; but no one will doubt that such surgical operations are justified in cases where the nervous system is in a special degree injured by the above-named affections. This, however, is often the case, as well by reflex and sympathetic processes as by injury of the general state of health due to the constant pains, hemorrhages, and disturbances of digestion. Moreover, the tendency to psychical derangement often operates injuriously. Certain diseases and anomalies of the uterus, as hypertrophies, fibro-myomata, retroflexions, rudimentary developments, are by castration partly cured with much certainty, and partly hindered in their injurious actions. Nervous symptoms are induced very commonly in uterine derangements in a direct or indirect manner. The question of performing castration may arise in these cases as soon as a psychosis or highly developed neurosis is kept up by those affections; even when other consequences of them do not require the operation.

Castration further has not only been proposed, but also performed in cases where no demonstrable disease or anomaly of the sexual organs existed, but only a group of symptoms of nervous nature, such as is often observed in disorders of the genital organs. The existence of such a condition was assumed in spite of the negative result of the examination, and it was said that on account of its delicacy it was not accessible to our diagnostic appliances. This view scarcely deserved to be refuted. Just as there exists a nervous dyspepsia, so there exists also a group of symptoms in the nerves of the genitals and in their vicinity, without

there being the least anatomical alteration of those organs. The possibility that such a condition during the exploration may be overlooked, must be admitted, but who would undertake an operation fraught with danger to life on such a possibility?

Whilst in the above case the pathological alteration was always only taken for granted, by others it has been regarded as completely superfluous. The neurosis or psychosis is thought essentially to be induced by the sexual functions, especially by menstruation, in which the organs themselves may be quite sound. Appeal has especially been made to the periodic psychoses, and very serious epileptic or hystero-epileptic attacks appearing only at the catamenial epochs. The origin of these grave forms is certainly best elucidated by the consideration of the dysmenorrhœa so frequently occurring, in which either no change of the sexual canal is present, or the existing disease is out of all proportion to the violence of the disorder. We see that the patients in question often inherit a tendency to nervous disorders, or have been subjected in childhood to injurious influences, and have been badly educated as regards both mind and body, or have passed through grave acute or chronic diseases (*e. g.*, scrofulosis, chlorosis), at that time or in the years of development. Often even in their childhood manifest signs of nervous disorder were observed, even the first menstruation was attended with pain and illness. In all such cases the cause of the dysmenorrhœa must not be sought in the sexual organs, but in the condition of the body in general, and especially in the condition of the nervous system. If now, together with the usual symptoms of dysmenorrhœa, or in the place of the latter, we observe grave sympathetic pain in remote parts of the body, and motor and vasomotor disturbances, or even psychoses, we shall much more incriminate the general derangements. We are the more justified in this, as signs of nervous affection commonly also become evident in the interval.

The menstruation in this case only gives the last impulse to the complete outbreak of the disorder already imminent, and determines thus only the time of the attack. It must be allowed that this explanation does not meet the case invariably nor always completely; menstruation is not always the last drop of water which causes the already full vessel to overflow. Its part in the neurosis is sometimes manifestly greater, and cases are even seen in which that sexual function must almost exclusively be incriminated as the cause. I have seen strong, absolutely healthy individuals without any tendency to nervous disorders, without any troubles in the intervals, attacked by the most violent pains during their periods; sometimes more extensive consensual phenomena were present. No anatomical change in the genital canal was demonstrable. In one instance hereditary tendency was present, so far as the mother had suffered with the same symptoms. An explanation for observations

of this kind is with difficulty given. Abnormalities of structure probably exist in the ganglionic system or in the lumbar cord, in which exclusively the districts devoted to the sexual functions are concerned. This matter has in recent literature been treated but scantily and superficially, although the enigmatical phenomena appearing in such neuroses, and especially in vicarious menstruation, are of great interest. The older authors occupied themselves more with this subject and have brought together much relating to it, but the observations have been collected with so little critical acumen that they are useless. Naturally, on account of the darkness prevailing on this subject, it is impossible to lay down rationally an indication for castration in such cases.

Many gynecologists went now still further and completely gave up looking, not only for any pathological alteration of the sexual organs, but even for any connection of the neurosis or psychosis with the sexual functions. By this castration has been specially hindered in its development and in its reputation. The opponents won an easy victory in their opposition to an operation never free from danger, and which has to be executed in a disease standing in no causative connection with the genital apparatus. Battey has always maintained a causal connection with menstruation, and expressed himself very cautiously in setting forth indications for the operation: "In cases of long-protracted physical or mental suffering, dependent on monthly nervous and vascular perturbations, which have resisted persistently all other means of cure, the question of a resort to the operation is to be committed to the prudent judgment of the conscientious practitioner in each particular case." Battey and Sims (who first decidedly countenanced the operation in America) have, so far as I know, never once removed the ovaries unless considerable morbid conditions were present in the genital apparatus. Not until later have unwise castrations of this kind been often performed, when the organs were intact and the neuroses and psychoses were not at all, or but slightly, connected with menstruation.

An operative proceeding under such circumstances is not to be justified; the probability that after the removal of the germ glands nutrition will improve and the temperament become calmer, gives as yet no prospect of the cure of a grave neurosis or psychosis. The communications respecting the influence of the natural climacteric on the course of existing nervous disorders are too contradictory to enable us to form a right judgment. One psychical or nervous disorder vanishes about this time, another gets worse; even persons previously healthy get ill at this time of life. The conditions under which the one or the other happens have not been properly studied. The experiments which up to the present time have been made with the climacteric artificially anticipated by castration, in the troubles we are now considering, are not very inviting.

Castration is indicated in a psychosis evoked or maintained by patho-

logical alteration of the sexual organs, and in a neurosis originating from the same source, as soon as this imperils life or hinders all occupation and all enjoyment of life. The indication is also present when that disease represents only one causal factor in the genesis of the affection, without the removal of which a cure is not to be thought of. Of course, also, the remaining causes of suffering must be in this case accessible to treatment. Other milder methods of treatment must have been tried previously without success, or, as in the case of many small tumors of the ovaries and tubes, must from the outset give no promise of success. Castration must actually affect the cause which occasions or keeps up nervous irritation. The operation will thus be of use when a degenerated or dislocated ovary represents the irritative focus, or as soon as a greatly swollen and retroflexed uterus presses on the sexual plexus and the organ is brought into a state of atrophy. Castration promises success when the bleeding and anæmia occasioned by a fibroma play an important part in the maintenance of a psychosis, so that a cure does not appear possible without getting rid of that evil; but castration is absolutely no universal remedy for any neurosis originating from a genital-organ disorder, or kept up by the same. The cessation of ovulation will avail nothing if the irritation starts from the nerves which are compressed in a shrunken cicatrix of the broad ligament, or elsewhere in a cicatrix of the pelvic connective tissue.

The proof that a neurosis or a group of nervous symptoms has its cause in an affection of the genital organs cannot always be easily given. The simultaneousness of the two things proves, of course, nothing by itself; the seat of the nervous troubles is of great value; we find in woman, extremely often, phenomena which run their course in the numerous nerves connected with the lower part of the lumbar cord. A feeling of pressure, pain, and bearing down in the sacral region, dragging and radiating pains in the iliac regions and in the upper part of the thighs, coccydynia, and anæsthesias and hyperæsthesias of the introitus, vaginismus, bladder troubles, tenesmus, semiparesis of the lower extremities, and other symptoms belong here. The nerves with which we have to do here are often directly attacked by the disorder; for the most part, however, the phenomena are partially or almost exclusively of a sympathetic or reflex nature. The most varied combinations of the different symptoms are observed in reference to number and intensity. The series of phenomena have been brought for some time into connection with sexual disorders.

The later physiology, which has discovered in the lumbar cord a chief centre of the genital functions, speaks on the whole for the correctness of this view; those "lumbar cord symptoms" are in the woman incomparably more frequent than in the man, which agrees with the preponderating magnitude and importance of the sexual organs and

of their more frequent diseases. The presence of such phenomena is, however, no sure sign of the causal connection, since those may very well have another origin, viz., independent affections of the nerve centres and of the vertebral column, anæmic conditions, irritation of distant peripheral nerves other than those of the sexual apparatus, so that we observe them decidedly not rarely, when the latter is completely intact; whilst we sometimes find them wanting, though very severe morbid changes exist. Its presence has always a decided value in support of the assumption of a causal connection, and this so much the more when the symptoms gradually extend themselves more widely from the sexual organs and their neighborhood, and thus stage by stage the nerves lying higher up are involved. At times this advance takes place along with the also gradually increasing local affection; in other cases, an "aura" in the course of the lumbar nerves precedes the attack occurring in some part of the body at a higher level, or precedes an attack of general convulsions. Simple painful sensations which radiate from the pelvis toward the hypochondria, breasts, and shoulders, are very frequently complained of. Also we sometimes see neuroses only on the side of the body on which the organs (ovary, tube, ligament) are exclusively diseased. A neurosis in parts of the body lying at a distance changes its seat sometimes for one which appears in the genitals or in their vicinity. Many nerve tracts are very intimately connected with the sexual apparatus; the consensus with the stomach, throat, breasts, larynx, thyroid, has been already dwelt upon by the old physicians. Individual nervous symptoms readily concur with determinate genital disorders; thus the pains from the iliac region radiating toward the hypochondria, breasts, and shoulders, concur with inflammatory conditions in and around the ovary; gastric disturbances concur with retroflexion of the uterus.

Great stress has been laid on the time relation between the first appearance and the later progress of neuroses and certain phases of sexual life. The nervous affection begins with puberty or with the first cessation of the periods in the climacteric; it appears only during menstruation or in the middle of the interval, or in pregnancy. The coincidence with menstruation, as we have above remarked, has been overestimated; it is, however, always of importance, and this so much the more the more free from trouble the interval is. The connection may sometimes also be demonstrated by the vanishing of the neurosis during a certain stage of sexual activity. The cause is then usually very clear, as in the rising of a uterus which has become pregnant out of the pelvis. Sometimes it can be demonstrated that the neurosis has arisen simultaneously with the beginning of the anatomical change, and that every exacerbation concurs with an exacerbation of the sexual disorder. The outbreak and conversely the restraint of nervous symptoms by mechanical agents—*e. g.*, pressure purposely made to operate on the sexual organs, especially on

the ovaries—has been looked upon as a very certain proof of their origin. The incorrectness of this view has soon been made evident. The nervous system is so coherent a whole, that a transfer of the irritation, especially in the morbid state now under consideration, is very easily possible in all directions. An irritation applied to the ovaries may, therefore, start an attack which originally arose primarily in a reflex manner from some other part of the body, or which had its origin in an alteration of the centre.

The risk of deception is especially great when the phenomenon starts in the sexual organs, whilst the cause is situated in the centre, as is not rarely the case in central ovarian neuralgia. Pressure on the ovary is in this case often extremely painful, just as touching the face in a tic douloureux of central origin. The dependence of a neurosis on a sexual malady can unfortunately but rarely be demonstrated in the way of experiment; this may occur, however, especially in anomalies as regards form and position of the uterus, as when reposition, the introduction of a ring, or the straightening of the organ has put an end to obstinate vomiting, hemiplegia of the lower extremities, or a persistent convulsive cough, whilst the recurrence of the dislocation immediately recalls the old mischief.

The determination of the causal connection gains in certainty if we are able to follow the genesis of the neurosis. The more immediate causative motor through which the first attack on the nerves arises, and the place where this happens must be discovered. The direct effects of the original irritation but seldom remain isolated on account of the special quality of the female nervous system. Further sympathetic and reflex influences soon come into play, so that the first starting-point is, it must be confessed, often not easily found out. Compression as well as extension and dragging of the nerves, partial or complete exposure of their terminal branches, play continually a principal part in the production of the first phenomena. Pressure is occasioned in a double way, a swollen or dislocated organ, or an exudation, or a special tumor, compresses the neighboring nerves, even a whole plexus; quite as often compression takes place in the interior of the tissue, as in inflammatory foci, connective tissue hyperplasias of the uterus, and is especially marked in the contractive processes of the ligaments and of the pelvic connective tissues. The contracting stroma in the so-called cirrhosis of the ovary hinders the dilatation of the follicles, gives an impulse to their abnormal involution and to abnormal conditions of tension. Dragging occurs especially in sinkings, prolapses, and backward displacements of the uterus, dislocated ovaries, small very movable ovarian tumors; combinations of dragging and pressure occur in inflammatory processes attacking the peritoneal attachments of the uterus, as soon as the intra-abdominal pressure is increased by the upright position, by walking, or by some

powerful action of the diaphragm. The degenerated tissue is compressed in considerable flexions at the angle of bending, and stretched at the opposite wall. Retained secretion conditions tension in endometritis, and excites contractions which are the more painful the less easily the outflow takes place. Stenosis due to swelling of the mucous membrane of the cervix or simultaneous flexions, may then act especially injuriously. Also draggings of the adhesions, which have been produced during the perimetritis which so often complicates these affections, are results of those contractions. The natural movements of the uterus and the bladder, and their extensibility, are hindered by their being embedded in contracting exudation, which gives occasion to painful contractions and dragging on the stiff, surrounding parts. The extraordinarily severe colics which often set in in an intermittent manner in carcinoma of the body of the uterus, in extensive endometritis, and in pyosalpinx, are sufficiently known.

There are catarrhs of the vagina which are accompanied by atrophic processes, attended even by formation of considerable strictures; these though occurring for the most part in elderly women, are sometimes, however, met with in young people. Severe irritations ensue especially when coitus is not avoided; moreover, infective and even innocent catarrhs of the sexual canal, and even of the introitus, together with papillary swellings, erosions, intertrigo, and at the same time excrescence at the meatus urinarius not infrequently lead to troublesome nervous complaints. Considerable gaping of the introitus with insufficient closure of the vagina favors the penetration and the action of all mechanical and infectious agents.

Anatomical changes are not always very extensive and may yet lead to very considerable irritation; large neoplasms, carcinomata, ovarian tumors often cause no nervous disturbances, while a little cicatrix and apparently unimportant dislocation induce such. No measurement is possible in dealing with manifestations of nerve life, nor does the intensity of the disease do it. An ovary of which the ovulating tissue is completely destroyed, causes less trouble than one whose follicular apparatus, partially preserved, is embedded in a contracting stroma. The development of a somewhat intense nervous disorder from such a starting-point depends on very different factors. Many women have for years their local painful sensations limited to special tracts, others show more numerous phenomena in different branches of the sacral and lumbar plexus, without any important general nervous condition arising therefrom. Many, certainly, present one or other sympathetic symptom beginning in more remote parts of the body—*e. g.*, an intercostal neuralgia, an irritating cough, a cardialgia, without on this account any necessity arising for assuming the existence of a general neuropathy. The circumstances which induce such a state, are long duration of the local

disease, complicating effects of the same—*e. g.*, loss of sleep and of appetite from the pains, accompanying losses of blood, copious leucorrhœa, dyspareunia, and in consequence mental depression and too great attention directed to the evil. The involvement of the psyche which often soon ensues, usually leads rapidly to a general neuropathic condition. When we have to discuss the question of executing an operation dangerous to life, we must procure complete information respecting the following points—viz., whether the genital disorder existing is the only, or at least most important etiologicā factor for the origin of the neurosis, whether other causal motors are not in operation, and what significance these have when such are present. This is so much the more necessary as the dependence of the neurosis on the sexual disease is seldom direct, as in the case of an experiment, but can only be established through a kind of indicative proof. We must therefore carefully test the different points which speak for and against, and, also, finally endeavor to exclude other causes, which have especially to be weighed in considering the genesis of the nervous disease. To this category belong diseases of other organs and parts of the body, especially of the stomach and large intestine. An error may easily creep in when retroflexions are present from relaxation of the peritoneal attachments of the uterus. We are very much inclined to ascribe the complaints which in such cases are often met with, to that dislocation; this, however, is often incorrect, or not justifiable, since very often an extensive insufficiency of the whole pelvic portion of the abdominal wall, and of the peritoneal attachments of numerous viscera exists with all its consequences—*e. g.*, depression of the liver, mobility of the kidneys, hanging down of the intestine from an elongated mesentery, ampliation of the stomach, meteorism, and others. The retroflexion represents only one part of a more extensive anomaly.

The exclusion or consideration of causes which, without having anything to do with the diseases of special parts of the body, bring forward that which we so commonly try to comprehend under the names of neurasthenia, spinal irritation, and hysteria, is for us of the greatest importance. We shall consider thus the congenital tendency which is sometimes expressed by coexisting formative defects of the body (signs of degeneration), hereditary conditions, the injurious influences operating in childhood—*e. g.*, bad corporeal and mental education, chronic and acute grave disorders. Unsatisfied sexual impulse, onanism, coitus interruptus, the use of preservative means, fruitless attempts at cohabitation from the narrowness of the hymeneal opening, or from the defective power of the man, emotional troubles (especially such as operate during a great length of time), grave diseases as typhus, and especially diphtheria, the manifold harmful agencies of social life, often lead to grave nervous disorders. Certainly, sexual circumstances often come into play

even at the first excitement of the nervous condition, or sexual influences produce this effect at a later period. In many cases neurosis and sexual disorders are coresults.

We will finally discuss the causes of the mishaps which unfortunately are not rare, and which have brought the operation otherwise so beneficial into discredit. Castration has had the same fate as many other curative measures; it was at the outset received with enthusiasm, was announced as the arcanum for all possible evils, and has finally in many quarters been completely rejected, when it did not of course completely fulfil the previously cherished expectations. The greatest part of the defective results has doubtless depended on the false position of the indication. All operations which are undertaken without the presence of a disease or anomaly in the sexual system are, according to the present standpoint of our knowledge, unjustifiable. The mere presence, however, of a pathological change in the genital system, as has commonly been held, is not sufficient, and a strict proof of the causative connection between that change and the nervous disorder has to be demanded. It was, moreover, not suspected that castration, even when the causal connection existed, might not yet be able constantly to affect the motor of the sexual disease from which the nervous excitement proceeded. Far too little regard was paid to the causes, which together with the genital affection coöperated in the origin of the nervous affection. The cases in which the sexual diseases can be described as the only, or almost only cause of the evil, are certainly not very frequent. Several or even numerous factors concur in the production of the symptoms, as we find to be the case in many other pathological conditions. Castration may here be fully indicated, since it often procures the condition under which alone cure is possible, but also the actions of other than the sexual causes must then be accessible and subjected to treatment. A supplementary treatment of this kind must of course follow castration, when the tedious troubles induced by sexual disorder have produced such extreme nervous weakness and irritability that the latter cannot possibly vanish immediately after the operation. The so-called stability—*i. e.*, the duration of the neurosis after the cause has been removed—we sometimes find here, as well as in other cases; we shall, therefore, do well to watch our cases of operation for some considerable length of time.

This is also needful, because a circumstance belonging to the natural consequences of castration not unfrequently acts unfavorably on the nervous system. The natural climacteric change induces sometimes, even in healthy women, a multitude of nervous and even psychical phenomena. The vasomotor disturbances are especially notorious. This effect of the change of life commonly operates still more effectively in persons whose nervous system is already deranged. The artificial anticipated climacteric will therefore, equally with the natural, act with more potency on

patients in this state, and will evoke the ordinary nerve disorders of that epoch in an exaggerated form, and with recurrences more or less positively expressed, of the troubles on account of which the operation has been performed. Happily, the prognosis in these cases is not bad. Improvement ultimately sets in, though certainly often after somewhat long delay. I have seen complete recovery take place in several women, in whom these troublesome conditions had lasted over a year. The view here and there expressed by some gynecologists, according to which the cure of a neurosis obtained by castration is the result only of psychical impressions, finds in the above fact its best refutation.

Another not infrequent cause of ill success consists in the setting up of circumscribed inflammations of the peritoneum and connective tissue, or in the exacerbation of such processes existing prior to the operation. The changes are for the most part not very extensive, consisting of connective tissue capsules round the ligatures, small knots, cicatrices, hard shrunk portions of the ligaments, cords and thready adhesions between the different pelvic structures, or even between these and the intestines. The course of the inflammatory process is often very insidious (creeping). The first ten or fourteen days after operation may be free from fever. I have no doubt that "pathemata" of this kind are more frequent in all laparotomy cases, and those with intra-peritoneal treatment of the stump, and also in ovariectomies, than is usually assumed to be the case. The occasions thereto are, however, in castration more often present in that operation. We have two commonly stiff, short but wide pedicles, formed by the removal of the tubes, which is generally undertaken at the same time. The mucous membrane of the tubes is not seldom diseased, and therefore easily sets up infection. A remnant of the ovary left behind, or part of a pathologically altered tube, has in some cases formed the starting-point of inflammation; the material of the ligature may sometimes be at fault, at least one has seen in abscesses and perforations the remnant of the threads. These inflammations, and the atrophic processes therewith connected, give, of course, as elsewhere, occasion to nervous irritations. The relapses which often occur very late, even sometimes after the lapse of a year, though the neuroses had completely vanished immediately after the operation, are certainly to be explained partly in this manner.

The inflammatory processes have not rarely yet another injurious sequel. This is the onset of periodic hemorrhages resembling menstruation; we must, however, completely abandon the idea that ovulation alone can cause periodic discharges of blood from the sexual passages. Various other processes, among which we must place mechanical disturbances of the circulation, and nervous influences acting through the vasomotor nerves, are equally able to do this. We have among the pathological conditions, in the ligaments, often on both sides, compres-

sion of the vessels which return the blood, collateral fluxions, and nervous irritations. The inflammatory focus arises in the site of the germ gland, and the same nerves are affected, not in their internal filaments only, but also in their larger branches. We have even observed swelling of the focus during the hemorrhage corresponding to the enlargement of the ovary during the time of menstruation, and therewith labor-like pains analogous to the ordinary troubles of dysmenorrhœa. Other additional facts may be adduced in favor of the view respecting the cause of many periodic hemorrhages after castration. The natural climacteric is often very notably delayed in cases of chronic pelvic peritonitis, hydrosalpinx, and pyosalpinx. I have seen menstruation occur quite regularly in young women suffering from pyosalpinx with greatly contracted ligament, though the ovaries at the operation were found completely atrophic and bereft of follicles. The ovaries were extirpated along with the tubes, and in spite of this the periodic hemorrhage continued. Long ago inflammatory affections of the uterine appendages, small ovarian tumors complicated with pelvic peritonitis, and salpingitis were looked upon as causes of menorrhagias and irregular hemorrhages. Morbid processes in the uterus and its vicinity may, after the climacteric has long run its course, produce periodic discharges of blood. Veterinary surgeons ascribe the duration of the rut after castration to pathological conditions of the sexual organs, especially in cows, to tubercular deposits in the mucous membrane of the tubes and uterus.

The object of castration cannot, of course, be attained so long as the duration of a periodic hemorrhage, or of irregular congestive conditions and hemorrhages, is kept up by inflammatory foci. If the neurosis had its motor in the ovary, another focus of irritation appears in the place of the diseased organ; if the cause lay in the uterus, its atrophy and the suspension of its activity are not attained.

Such chronic inflammatory processes are with difficulty completely avoided. Silk appears to be not altogether the best material for ligature, since it is difficult to disinfect it completely, or at least, though disinfected, it readily takes up again injurious matter. Catgut is not always applicable, at least not in cases of very stiff, unyielding ligaments. A perfectly healthy tube is best left behind, when this can be done with complete extirpation of the ovary; its removal at the same time necessitates a more considerable ligature, and a great mass of enclosed tissue. Under such circumstances extirpation is quite superfluous, since the Fallopian tube after castration atrophies quite as much as the uterus. A diseased tube must, of course, always be removed. The formation of adhesions to the intestines is best avoided by inducing early action of the bowels after the operation. In every case we must keep our patients under observation for a considerable period; temperature observations must be kept and a suitable treatment begun on the appear-

ance of inflammatory phenomena. Defective cicatrization or even the formation of neuromata in the ligatured pedicle has been described as the cause of unfortunate results, and this view has been supported by the analogy of amputation stumps. This appears *a priori* not improbable. More accurate observations with anatomical examinations are wanting.

On the other hand, there is no doubt about the injurious influence of considerable relaxation of the abdominal walls, or actual eventrations and gastrocele. Those conditions are either already present before castration and are then increased by the latter, or they develop only after the operation and in consequence of it. The bad results are produced partly by the depression of the intra-abdominal pressure, partly through the traction which the attachments of the viscera experience, when the external support is defective. Lastly, we must still mention that to imperfections in the execution of the operation, not infrequently may be attributed the blame of a bad result. The incomplete extirpation of the ovaries is a point here to be especially noted. We have to do, as it appears from what has gone before, in this matter of castration for neuroses, with very complicated circumstances. The matter is not nearly so simple as it might have appeared at the time of the first operation. In order to insure success, we must very accurately lay down the indication for each individual case, especially keep apart the various causal motors concerned in the production of the nervous disorders, and be sure that we do not merely touch on the sexual factor, but also be able to put aside other existing injurious influences. The execution of the operation and a careful after-treatment in reference to the possible consequences, have still to be very carefully considered.

Successful results will not be wanting if we proceed according to the principles laid down in this essay. I dare not say that, especially in the beginning of my castrations, I have had no bad results; but I have also had many results of a brilliancy that can rarely be witnessed after any other operation.

ALFRED HEGAR.

WITHIN my knowledge it has not been the practice of American surgeons to attempt the cure of mental and nervous disorders by the removal of healthy ovaries or of healthy tubes. The ovaries removed, and the tubes as well, have presented visible signs of disease—signs which are evident to the naked eye and palpable to the sense of touch. For the misconception upon this point still existing, my own ignorance of both the histology and pathology of the ovaries is largely responsible in that, during the early history of the operation, I removed ovaries which I erroneously supposed to be healthy, and gave to the operation the unfortunate and now obsolete name of “normal ovariectomy.”

In the ovaries are quite frequently found small cysts, more or less numerous, filled with a clear, yellow liquid, alone or intermixed with blood, and of variable consistency. This form of cystic degeneration is to be distinguished from the early stage of ordinary ovarian cystoma, in that it is extremely slow in its growth, remaining almost stationary for one, two, or three or more years, and in that it is often accompanied by pain, by great tenderness of the ovaries, by derangements of the stomach, breaking down of the general health, and, quite often, serious disturbances of the nervous system. In some cases these cysts appear to take on an acute inflammation of the lining membrane and the contents become purulent. Another form of ovarian disease exhibits a sort of sclerosis of the investing tunic, it being thickened, blanched, and generally corrugated. The stroma also presents a sort of fibrous degeneration. In other cases the ovaries are very much shrunken in size, and resemble in gross appearance the senile condition of these organs. Quite often the ovaries are bound down by adhesions to adjoining structures, or so buried in lymph deposits as to be with difficulty even recognizable.

The tubes removed have presented evidences of chronic salpingitis, or were specimens of hydrosalpinx or pyosalpinx. Often the tubes too are extensively adherent to contiguous structures by plastic lymph.

The operations now under consideration have been done for the relief of mental and nervous disorders, which may be divided into three classes, namely, oöphoro-mania, oöphoro-epilepsy, and oöphoralgia. I use the terms oöphoro-mania and oöphoro-epilepsy instead of hystero-mania and hystero-epilepsy, because my clinical experience teaches me that these disorders are dependent upon a nervous irritation proceeding from the ovaries and not from the uterus. I say that my clinical experience so teaches me, because, (*a*) I find the disorders existing in cases where I recognize organic disease of the ovaries, and am not able to recognize any organic disease of the uterus; (*b*) in cases of uterine as well as ovarian disease, when the diseased ovaries are removed, the nervous disturbance disappears notwithstanding the fact that a displaced or diseased uterus may remain. In my experience the time required for the disappearance of nervous disorders, after removal of the ovaries, has been quite variable. In general, epileptiform manifestations have ceased at once. Some of the cases have required for a time the tranquillizing effects of the bromides to ward off threatening symptoms, whilst others have needed nothing. My cases of mania have all been quite chronic and the improvement has been slow. In oöphoralgia, in a few instances, the cure has been immediate and permanent. In the majority it has been slow and gradual; and in others nothing has been gained for even two years after the operation. In a few of these cases the long-established opium habit has proved a complete bar to recovery.

In my cases which have had two years or more to test them, seven

have been cases of oöphoro-mania; nine, cases of oöphoro-epilepsy; and twenty, cases of oöphoralgia. The results have been tabulated as follows:

	Cured.	Improved.	Not improved.	Total.
Oöphoro-mania . . .	1	4	2	7
Oöphoro-epilepsy . . .	9	0	0	9
Oöphoralgia . . .	13	3	4	20
Total . . .	23	7	6	36

With reference to the tubes, I may say I have no experience of the effects of their removal on the state of health. It has always been my practice to remove them when diseased and let them alone when sound. In retrospecting my cases I am not able to say that the removal or non-removal of one or both tubes has in any wise seemed to affect the final results of the operation. Of the thirty-six cases now reported, I find:

	Cured.	Improved.	Not improved.	Total.
Both tubes removed . . .	1	0	1	2
One tube removed . . .	4	1	2	7
Tubes not removed . . .	17	5	5	27

It should be remarked, of the cases of mania, that the duration had been from three to fourteen years. Three had been inmates of asylums—one of them for nine years. Of the epileptic cases the majority were of one to three years standing and one extended to six years. The cases of oöphoralgia varied from three to twelve years in duration—but few of them less than five years.

The published records of similar operations in America are not accompanied by such authentic statements of their after-progress as to make them useful at all for my present purpose. When it is noted that the neuroses have disappeared, or have persisted, the lapse of time has been entirely insufficient to determine any positive result. In my own cases a patient who has seemed to be entirely well at three or even six months after operation, has afterward relapsed again into the old rut. *Per contra*, another case which has been little, if at all, benefited during the first year, at the expiration of two, or even three years, proves to be soundly cured. These remarks are especially applicable to oöphoralgia. My cases of oöphoro-epilepsy have given me the most satisfactory results. The cures have been both prompt and complete. This may be in part due to the fact that the exigency of the cases has brought them earlier to the arbitration of the surgeon's knife. Indeed, I am quite convinced of the fact that earlier operation of neurotic cases, before the nervous system has become too much enslaved, can alone yield results fully satisfactory.

It is an interesting fact that removal of the ovaries has been occasionally followed speedily by acute mania. One such case was shown me some years ago by Prof. T. G. Thomas, of New York, the only one I have

had opportunity to observe. Several such cases have been reported, one by Prof. Goodell, of Philadelphia. Such result is not, however, peculiar to this operation, for it has been observed to follow upon other surgical operations in no wise connected with the reproductive apparatus. It has occurred to me to see the operation, in two instances, followed by acute parotiditis, suggestive of the metastasis in the opposite direction, so often observed in mumps. Dr. Goodell, and others, have reported such cases.

The limited time at my disposal has not allowed me to gather the results of American operators as fully as I would have desired. I am, however, able to cite, in a general way, the experience of a few of them.

Prof. Wm. H. Byford, of Chicago, writes me: "Sixteen years ago I was consulted by a married woman, aged twenty-eight, who had two children, about a large ovarian tumor of five or six years standing. In giving the history of the case she informed me that she had epilepsy since about the time she commenced menstruating. At first the fits came at long intervals and were mild. They gradually became more frequent and grave, until they returned once in two or three weeks and were intensely severe. Her mind was so much impaired as to cause great anxiety to her friends. She was, in fact, in such a dilapidated condition as to excite discussion between her friends and physicians whether the risk of so grave an operation as ovariectomy was worth while. It was determined to rid her of her great burden in the hope that it might somehow benefit her general condition also. The tumor was large, polycystic, and extensively adherent, and the operation was attended with much difficulty. The opposite ovary being cystic and four inches in diameter was also removed, and I noted at the time that both ovaries were completely extirpated. Twenty-four hours elapsed before she rallied entirely from the shock, and a moderate attack of septic peritonitis protracted her convalescence to over four weeks.

"The points of interest to us in the case are: 1st. That during the second night after the operation and whilst under the influence of morphia for pain, she had a frightful attack of convulsions, so severe and prolonged as to cause great consternation and alarm for her immediate safety. The phenomena were characteristic in every way of an epileptic attack. 2d. That she never after had another convulsion and is to-day in the enjoyment of excellent health. Was it true epilepsy this woman had? I have not now, and never had, a doubt about it. It was recognized as epilepsy by all the physicians who saw her. A noteworthy fact in this connection is that one of her sisters, much younger than herself, is now passing through a similar epileptic experience in a milder form of hystero-epilepsy. She has decided ovarian symptoms and the paroxysms are becoming more and more pronounced, and bid fair, if not interrupted, to result as disastrously as in the older sister. I forbear speculative remarks, and simply give the facts as I observed them. I think, however, they demonstrate clearly a connection between the reflex effects of ovarian disease and true epilepsy in some cases.

"In a case of double oöphorectomy for the relief of prolonged invalidism attended by frequent headache of indescribable severity, the operation was an entire success. This patient, four years before the operation, was insane for several months. It is now five years and the patient remains in good health.

"Three years ago I did this operation for an aggravated form of nymphomania. The patient is now cured of her terrible malady. The ovaries and tubes in this case were greatly congested, and the tubes were removed as well as the ovaries. In the second case, the ovaries were in a state of incipient, cystic degeneration; the tubes appeared healthy and were allowed to remain.

"In looking over my cases I find that all my patients on whom I have operated for nervous disorders were greatly benefited. Some of them have passed from my observation, and of these I cannot say how permanent the improvement has been. Whilst no doubt oöphorectomy is too frequently resorted to, I entertain no question that it is entitled to a legitimate place in surgery for desperate nervous conditions."

Prof. Reamy, of Cincinnati, writes: "I have removed the ovaries in but one case for relief of epilepsy. This patient likewise suffered dreadfully from ovarian neuralgia, and dysmenorrhœa. The time since the operation—only a few months—is too short to determine what the results are to be; however, up to present time relief has been complete. In two other cases where I have done the operation for relief of dysmenorrhœa and neuralgia, one case is completely relieved, the other not improved. My opinion is that in properly selected cases the operation is invaluable in its results, effecting complete cures in some cases and marked relief in others. It is my serious belief, however, that the operation is liable to abuse, and that there is a growing danger in some quarters from this cause."

Prof. M. D. Mann, of Buffalo, reports two cases operated on for ovarian neuralgia more than two years ago. Both were relieved of pain, making slow but sure recovery, and adds: "It seems to me in properly selected cases, the operation is not only justifiable but urgently called for, but that these cases are very few."

Dr. R. S. Sutton, of Pittsburg, gives me the particulars of one case of insanity:

"My case was Mrs. R., aged thirty-one, operated on September 16, 1884. Her uterus was retroverted and firmly adherent posteriorly. The left ovary and tube were glued together by adhesive inflammation and lay behind the uterus adherent in the cul-de-sac. The right ovary and tube were glued together and adherent to the side of the rectum. All adhesions were broken up and both ovaries and tubes removed by Tait's method. The woman recovered and is still living. Her insanity soon disappeared and she remains free from mental diseases and from nervousness. I have observed in many cases that when marked nervousness existed, it either entirely disappeared or was greatly lessened after removal of the ovaries or ovaries and tubes."

Prof. W. T. Howard of Baltimore, kindly communicated two very interesting cases.

1. "Miss J. H., single, aged twenty-three, consulted me in December, 1882. She began to menstruate at fifteen, and enjoyed excellent health until she was twenty. During the past three years she has suffered intensely the entire menstrual period of five to seven days. During all this period she had numerous attacks of hystero-epilepsy; the convulsions were often violent, and she would lie from seven to ten days with her feet perched high upon the wall as she rested in bed, in a state of hysterical coma, more or less profound, moaning and groaning in the most pitiable manner. The conjunctivæ were finely injected. All the

symptoms became intensified by even slight pressure over the ovaries. She had well-marked anteflexion and catarrh of the uterus. When she emerged from the catamenial period she was moderately intelligent until the next one arrived, but was subject to epileptic convulsions. I treated the uterine troubles until they seemed to be quite relieved, and kept her all the time upon Brown-Séquard's prescription for epilepsy. But there was no improvement in the severe dysmenorrhœa, and at times she would lie in a state of coma, writhing in pain, for ten days together. I was compelled to use hypodermatics of morphia very freely, as nothing else gave her relief from her intense agony. I have never seen any one suffer more severely from any disease whatever. She was repeatedly leeched over the ovaries, and counter-irritation by tincture of iodine and emplastrum cantharidis was employed many times, all to no purpose. I should have stated that at each menstrual period there was oozing of blood from the umbilicus and she often spat blood from the mouth, but did not cough it up nor vomit it. Having despaired of relief by other means, I removed the ovaries and tubes November 19, 1883. She was then very thin and pale—looked as if she would ere long find relief in death. She had a severe attack of peritonitis, and was ill for near five weeks. She made a perfect recovery from the operation, and all the distressing symptoms gradually disappeared. She never menstruated from the uterus afterward, but for some months at the catamenial periods she would bleed about the umbilicus. The last I heard of this lady she had recovered and married, perhaps six months ago. The ovaries were at least twice the normal size and resembled in appearance those from another case which were examined for me by an excellent pathologist and microscopist, Dr. W. T. Councilman, of the Johns Hopkins University."

2. "Miss B., single, aged twenty, consulted me in April, 1884, and was under my care for nearly three months. For more than two years she had suffered from severe and almost incessant cephalalgia. She had no uterine disease whatever, but was constantly in a hysterical, and hyperæsthetic condition; indeed, I have never seen any one more so. She had been treated by a highly intelligent physician of Virginia, where she resided. He had carried her to New York, where she remained for some months under the care of one of our most eminent general practitioners. Her physician told me she had taken her weight in bromides and chloral until now they have no effect whatever. A seton had been inserted in the nape of the neck and one in each iliac fossa. These had only the effect of producing local pains, but in no way alleviated the intense headaches, which nothing but the hypodermatics of morphia could diminish. Indeed, these were her only hope of respite so that she could get some hours of disturbed sleep. Having failed to diminish the poor girl's sufferings I sent her home.

"She returned to me again November 3, 1884, when I removed both ovaries and tubes. No unpleasant symptoms followed the operation, and in a few days the cephalalgia greatly diminished. She returned home January 14, 1885, with her parents, who were delighted with the result of the operation. She seemed like a new being. She was their only child, a handsome girl, of noble figure. But the fates were against her. Three or four months subsequently she sustained injuries from an accidental fall which terminated her life in a few days.

"The following is Dr. Councilman's note of the condition of the

ovaries: 'The ovaries contain cysts of various size, due to simple dilatation of the Graafian follicles. In addition to the cysts, there is a good deal of induration of the stroma, and in the right ovary an enormous formation of bloodvessels. In character this vascular formation consists of small arterioles which are in general tortuous and traverse the tissue in every direction. In some places they are so numerous that they resemble very much the convoluted sweat glands of the skin. In the left ovary I found several of the so-called menstruation fibromas, due to fibrous degeneration of the corpus luteum. The Fallopian tubes were dilated and the mucous membrane thickened and hypertrophied.'

Dr. H. P. C. Wilson, of Baltimore, writes:

"In my hands the operation of 'castration' in women for nervous and mental diseases has been most satisfactory; all the cases that I and my son, Dr. Robert T. Wilson, have operated on for the above conditions have been either much benefited or entirely cured. I have only time to mention one case operated on by Dr. Robert T. Wilson. A single woman, aged thirty-five, had been the subject of hysterio-epileptiform convulsions for several years. When brought to the hospital she would have from three to five a day, so violent at times as to endanger her limbs and apparently her life. She was worn away to a skeleton and her general nervous condition was indeed pitiable; all general and local treatment had been used without benefit. She grew worse. Her ovaries were removed. Her convulsions ceased. Her general nervousness is very little. She is able now to earn her own living and is an entirely different woman. I think the operation saved not only her mind, but her life also. I think the operation should only be done when all else fails to give relief."

Dr. B. F. Baer, of Philadelphia, says:

"My experience with the operation of 'castration' of women for mental and nervous diseases is quite limited, but what I have had is not favorable."

Prof. Wm. Goodell, of Philadelphia, writes:

"After the lapse of many years my cases of oöphorectomy for insanity, for hysterio-mania, hysterio-epilepsy, and pelvic neuralgia, show positive and permanent benefit. I can recall but two failures, and those were two cases out of eight of insanity or threatened insanity. The remainder, six in number, were cured. I ought, however, in candor to add that a ninth case, a dreadful one of hysteria, menorrhagia, and dysmenorrhœa, had two attacks of insanity after the removal of her ovaries."

Dr. T. Addis Emmet, of New York, says:

"I believe when the ovaries have become diseased (so that the condition can be recognized, and after other means have failed), they should be removed, and, as a rule, the same conditions will call for the removal of the tubes at the same time. I believe the field to be a very limited one, calling for the removal of the ovaries, whilst still in a comparatively healthy condition and before they have degenerated into new growths. The operation of 'castration' should be confined, in my judgment, to cases of absence of the vagina and uterus, where it is necessary to remove a source of irritation in existing epilepsy, insanity, or threatened phthisis in consequence of the want of development.

"I have watched with interest a number of cases where 'castration' had been performed in young women suffering from various nervous conditions, and, as a consequence, I am not an advocate for its perform-

ance. I feel satisfied that the operation would be seldom needed if these women could be removed from home and sympathizing friends, and could be placed under the needed moral influence, where they could be taught to get their nervous symptoms under control; and more especially where patient attention to details could be given with the object of improving the general condition.

"I have seen a few cases greatly benefited after the ovaries had been removed, but the nervous and neuralgic symptoms from which they suffered were, in my judgment, due to an anæmic condition. Efficient as the remedy may be, its practice is a reflection on our skill as physicians, and I am not willing to admit that 'castration' is necessary to cure anæmia and its consequences. I believe that the ovaries have very little influence, if any at all, in producing the symptoms attributed to them, and that the defect lies beyond in the great nerve centres. We are certain to see, and in the near future, a great reaction. I am therefore delighted that you should be selected to investigate and report progress, for I know you are too honest a man to advocate the frightful abuse of the operation existing at the present time.

"In my early life I had the opportunity of witnessing and of making many hundreds of post-mortem examinations. I was then impressed with a fact which has its bearing on this subject. I learned from observation that what seemed to be a perfectly healthy ovary, was a condition seldom found after death in any woman over twenty-five years of age. Cystic degeneration was very common, and often the ovaries were found bound down by old pelvic inflammations, when, during life, not the slightest symptom had been given to indicate any unusual local disease. In other words, I will state that every day ovaries are being removed for various nervous symptoms, and the roughened surface and cystic condition are shown as evidence of the necessity of their removal; a condition where I believe, as a rule, there exists no connection between the supposed cause and effect. The condition presented is often but a normal one, for every ovary undergoes the same cystic degeneration and becomes more and more roughened on its surface, year after year, from ovulation, until at length atrophy readily occurs as a consequence."

Prof. T. Gaillard Thomas, of New York, writes me:

"For all nervous and mental disorders in women which are created, or markedly aggravated by the process of ovulation I regard 'castration' as a most valuable resource. Thus far, my experience in the operation for *purely* nervous and mental disorders has not been very large. It extends to five cases:

"1. A case of insanity almost confined to the period of ovulation. 2. A case of hystero-epilepsy. 3, 4, 5. Cases of epilepsy; in one case confined to the menstrual epochs, and in two cases greatly aggravated by them. The case of menstrual insanity has been entirely relieved, as I learn by a recent letter from the lady's brother-in-law, a physician practising in New Jersey. The case of hystero-epilepsy is cured. The case of epilepsy confined to menstrual periods is cured. The two other cases of epilepsy seem in no wise improved. 'Castration' of the female for nervous diseases has, in my opinion, a brilliant future before it, and yet, I feel that in this and in other conditions it is now being greatly abused by resort to it in entirely inappropriate and unnecessary cases."

ROBERT BATTEY.

REVIEWS.

THE INTERNATIONAL ENCYCLOPEDIA OF SURGERY. A SYSTEMATIC TREATISE ON THE THEORY AND PRACTICE OF SURGERY, BY AUTHORS OF VARIOUS NATIONS. Edited by JOHN ASHHURST, JR., M.D., Professor of Clinical Surgery in the University of Pennsylvania. Illustrated with chromo-lithographs and woodcuts. In six volumes. Vol. VI. 8vo. pp. xlviii. 1272. New York: William Wood & Co., 1886.

THE last volume of this very valuable work has appeared, and the difficult task of the Editor has been accomplished. The labor of collecting the articles of distant and dilatory authors has occupied time, and has necessarily left for this volume certain chapters which would otherwise have appeared earlier in the series. The present volume begins with the œsophagus, and, in addition to abdominal surgery and the surgery of the uro-genital tract, includes an unusually interesting set of articles on diseases of the bone from the Lyons School, orthopædic surgery, hospital construction, military surgery, and the history of surgery.

The opening article on "Injuries and Diseases of the Œsophagus" is written by Dr. J. Solis Cohen, Professor of Diseases of the Throat and Chest. Dr. Cohen's name alone is a guarantee of the excellence of the work. If the author can treat diseases and injuries of this portion of the body as well as he writes of them, he constitutes a significant example of the tendency to a gradual absorption of general surgery by the various specialties. It has been said that all that is now left for the general surgeon are fractures and amputations. Now that laryngologists consider themselves at liberty to write about the stomach, the statement does not seem exaggerated.

The article on "Intestinal Obstruction" is by the Editor himself. In view of the great prominence at the present time of this department of surgery, and the growing tendency on the part of surgeons to resort to abdominal section in the various forms of obstruction, the conservative attitude taken in this article imparts to it special value. The author calls attention to the existence of enteritis in a large proportion of the cases of intestinal obstruction, and he strongly urges that the abdomen should not be opened, unless the surgeon "has been able to form some distinct notion of what he expects to find, or at least until he has been able to satisfy himself that there is positive mechanical occlusion, and that no less dangerous operation will suffice for its relief." In cases of acute obstruction not obviously due to a mechanical cause, the treatment should be that adapted to enteritis, which consists in either general or local bleeding, the employment of poultices, warm enemata, and opium. A striking example is given of the advantages of this mode of treatment. We do not find mentioned in this article as a substitute for laparotomy in certain cases the method described a few years ago by Mr. Hutchinson, which consists in the administration of an anæsthetic and the employment of massage to the bowels, with inversion of the body. We

have seen an obstruction relieved in one case by the simple administration of ether.

Dr. Ashhurst is not an enthusiastic disciple of Lister, and we are therefore not surprised to find that he does not value antiseptic precautions in laparotomy. We presume few would now dissent from his objections to the use of the spray; but the number of surgeons is also very small who would not insist upon a strict application of all other principles of antiseptic surgery in these operations. The tables which accompany this article are, as is usual, in the writings of this author, very full and accurate. The article is a short one, but is replete with valuable suggestions.

The article on "Diseases of the Rectum" is written by Mr. Allingham. The author labors under the disadvantage of having little new to record in this department of surgery. That part devoted to cancer of the rectum is of interest as showing the practice of a prominent English surgeon in a class of cases the treatment of which varies greatly in different countries. The experiences here recorded do not give an encouraging outlook. Mr. Allingham says that the operation of excision, which he has performed about forty times, "is one likely to afford excellent results, and I am sure that, with increased experiences, the direct mortality may be decreased." Of all his patients, but one is alive seven years after the operation, although a number are still living at the end of two years. He protests against the practice of performing colotomy simply because a cancer exists in the rectum, and would limit that operation to those cases in which an obstruction or some complication exists and in rapidly growing cancers. It is evident that a slight reaction is taking place against the very free resort to colotomy by English surgeons. Further experience in this direction may confirm the more favorable results obtained in Germany after extirpation.

A very considerable portion of this volume is given to the consideration of "Genito-urinary Surgery," and the subject is divided among various authors. A very full description is found in that part devoted to the treatment of stone, of the various forms of evacuator used in litholapaxy, the new operation having given rise to a vast amount of mechanical ingenuity. It has been thought advisable, nevertheless, to give space to a separate chapter on the operation of lithotripsy. On the injuries and diseases of this region one of the most valuable articles is by Reginald Harrison, which treats of the bladder and prostate. We note with interest the brief account of the operation for prostatotomy, reported by the author at the International Medical Congress of 1884, an operation designed for cases not susceptible of relief by the ordinary means of treatment. The author defines the class of cases as that which "includes those in which there is unusual difficulty in using the catheter, in which hemorrhage almost constantly attends the use of this instrument, in which withdrawal of urine is followed by no sense of relief, and in which the bladder, by the constant presence within it of pus and tenacious mucus, is converted into little else than a chronic abscess-cavity through which urine percolates. These conditions represent types of the disorder which are rapidly fatal."

The operation consists in opening the membranous urethra from the perineum, then introducing a probe-pointed knife along the prostatic urethra, and making a section of the obstructing portion of the gland

in the median line. A drainage tube is subsequently worn in order to render the section permanent.

The article on "Diseases and Injuries of the Urethra" is by Dr. Simon Duplay, of the Lariboisière Hospital, and is interesting as a statement of the present practice of urethral surgery in the French school. Taking the treatment of stricture of the urethra as a standard of comparison between the French and the American schools, we think few readers would hesitate to decide that the former has not made that progress of late years which might have been expected. Many of the more advanced modes of treatment very generally adopted in this country are conspicuous by their absence. We are glad, however, to record that the old method of gradual dilatation has not been abandoned, as many readers of our periodicals might suppose, but finds in the author a staunch supporter.

"Injuries and Disease of the Female Genitals" have been allotted exclusively to American writers. Dr. Theophilus Parvin, Professor of Obstetrics and the Diseases of Women and Children in the Jefferson Medical College, writes the opening article. Here we find described the great variety of operations designed for the cervix, vagina, and perineum. As this article is written for a surgical work, it is not to be expected that much space should be devoted to local treatment, or to the use of pessaries. We fail, however, to find any mention of Alexander's operation for shortening the round ligaments, although the various colporrhaphies are carefully described and the text is pithy and clearly illustrated. Little is known, to be sure, about this operation, but many satisfactory results have been reported, and surgeons would naturally look for an account of the operation in an article of this kind. Dr. Parvin's skill as a writer has enabled him to produce a very readable chapter.

The chapters on "Cæsarean Section," by Dr. R. P. Harris, of Philadelphia, and on "Ovarian and Uterine Tumor," by Charles Carroll Lee, of New York, are both carefully prepared and well adapted to this work, and will be read with interest by the general surgeon as well as by the specialist.

Perhaps the most novel feature of this volume is the series of articles on "Diseases of Bones," by the late Prof. Ollier, of Lyons, and his pupils. Many American and English readers will doubtless find these chapters hard reading, and we fear they will not receive that attention which they deserve. In this country we excel in the practical treatment of bone disease, but the lack of knowledge of the pathology of this very common class of diseases is woefully great. At the present time, when surgeons are beginning to be aroused to the fact that tubercle is as much, if not more, a surgical disease than medical, the relation of tubercle to caries possesses an unusual interest. We have space to refer to but one or two points in the leading article by Ollier himself. The prominence given by him to that part of the bone designated the juxta-epiphyseal region as a point of origin of many of the diseases of childhood, is worthy of special mention. He says: "I have given the name juxta-epiphyseal to that expanded part of the diaphysis which is included between the central canal and the connecting cartilage, and it will suffice to bear in mind its structure and its relations in order to comprehend its importance in relation to osseous pathology." Not only owing to its physiological properties, but to the mechanical

strain brought to bear upon this part of the bone is due the importance of this region. "This zone of physiological proliferation is also the zone of election of pathological processes." . . . "The idea of juxta-epiphyseal osteitis then appears to me one of the fundamental points of the pathology of bones, wherefore I shall not cease to call attention to its nosological significance and to its therapeutic consequences." Ollier resorts freely to trephining, and recommends this operation in all painful forms of osteomyelitis.

Dr. Eugene Vincent, of Lyons, Surgeon of the Charité Hospital, writes upon the scrofulo-tuberculous affections of bone. The author divides these into the undoubtedly tuberculous osteopathies and the probable tuberculous osteopathies. To the former class belong encysted tubercle, or a cavity in the epiphysis containing cheesy material and tuberculous infiltration or the gelatinous transformation of spongy bone. In the latter class are found caries and spina ventosa. Whether bacilli are always found is doubtful, zoöglæa masses of micrococci having been observed in some cases reported. Further examinations are needed, of course, to establish these forms of bone disease on a firm basis, when we may hope for a somewhat more uniform and rational treatment of the masses of cases which crowd our clinics. We are glad to see that the seashore home is thought as important a factor in the treatment of the children of the poor as it is in this country, and the writer very properly suggests that these institutions should not be limited to the summer, but that suburban homes should be open the year round. No greater field is open to the rich philanthropist to-day than this. Among local remedies the hot iron figures conspicuously. According to Ollier, this "brings about necrosis of the carious portions; it imitates the process by which nature puts an end to caries in many cases. It has the advantage over spontaneous mortification of the diseased bone of exciting an energetic irritation; a healthy inflammation in the tissues which surround the necrosed part." Such treatment seems more rational than the simple scraping of caries, with which most surgeons are content. Whether many could be found to follow the author's advice in slight joint lesions of this nature, to open the joint with the cautery, and when the joint is opened, to "bream it with enormous cauterizing irons until the fluids which escape from it are at a temperature which the finger cannot bear," we think is doubtful. If, however, the articular surfaces are seriously diseased, he would not hesitate to prefer resection. M. Poncet's article on tumors of the bone is a fit companion to those of his colleagues, but we have not space to do more than allude to it by title.

The final article is devoted to "Orthopædic Surgery," by Mr. Fred-eric R. Fisher, Assistant Surgeon to the Victoria Hospital for Sick Children, London. It contains many useful details of treatment of deformities. The editor has very properly added a few remarks on the treatment of congenital dislocation of the hip-joint. The very remarkable case of cure reported by Dr. Buckminster Brown, of Boston, shows conclusively that we are no longer justified in classifying these cases in the class of incurable diseases.

The appendix to this volume is one that no reader can afford to overlook. Dr. Edward Cowles writes a chapter on the "Construction and Organization of Hospitals." His experience as army surgeon, as Superintendent of the Boston City Hospital, and later of the McLean Asylum,

has amply fitted him for the task. It is freely illustrated, and is a distinctly valuable addition to the literature of this subject.

Dr. Bennett A. Clements, of the U. S. Army, gives an account of the preparation of military surgeons for field duties, with descriptions and illustrations of the latest forms of ambulances and other apparatus required. The traditions still preserved from the War of the Rebellion and the constant need of active frontier service, give weight to the opinions of an experienced army officer even in times of peace.

A very condensed and erudite paper on the "History of Surgery," by Dr. George Jackson Fisher, of New York, closes this volume.

The first edition of the encyclopedia is now before the profession, but a favorable verdict has already been accorded to it in advance, and we feel sure that few will maintain that it is not fully equal to any work on surgery which has hitherto appeared in the English language. We have already alluded to the comparison between this and French and German works, the almost interminable length of which enables the reader to obtain great fullness of detail upon any special point referred to. We think, however, that wisdom has been shown in adopting a work of this scope as best adapted to the present needs of the profession, and we most heartily congratulate the editor and the publishers on the complete success of their undertaking.

J. C. W.

MEDICINE OF THE FUTURE. AN ADDRESS PREPARED FOR THE ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION IN 1886. By AUSTIN FLINT (Senior), M.D., LL.D. 12mo. pp. 37. New York: D. Appleton & Co., 1886.

THIS book will be received by the profession with unusual interest, from the peculiar circumstances of its preparation and appearance. Nearly a year ago Dr. Flint accepted an invitation to deliver the annual Address in Medicine before the British Medical Association in August of the present year. He had long been recognized, both at home and abroad, as the most prominent man on this side of the Atlantic in the department of general medicine, and as eminently fitted, by his capacity and attainments, to speak for his colleagues on such an occasion. Whatever he might say would command earnest and respectful consideration. He evidently gave to the subject his deliberate and careful attention. During the time remaining to him he prepared the address, without haste, in the intervals of his regular professional occupation, and while enjoying, for the most part, his customary mental and physical vigor. On the 13th of March he was suddenly and unexpectedly prostrated by a cerebral attack, and expired after a few hours of nearly total unconsciousness. The manuscript was found among his papers, so complete that it needed only the ordinary proofreading by his son, to prepare it for the press; and if the author had lived he would probably have changed it but little, if at all, either in matter or form. It is an address which was written, but never delivered. It has all the freshness of a living discourse, and it is the more impressive as coming from one who is no longer among his fellows.

It will strike all who are familiar with Dr. Flint's writings that there is in this essay no sign of impairment of his mental powers. If anything, its style is more lucid, more direct, and more agreeable than in his previous works. There is an ease of manner, and an absence of laborious composition, most appropriate to an anniversary address; and the successive topics are treated in a way to maintain the interest of the reader, without imposing too serious a task upon his memory or attention.

The author claims his privilege as a "medical semi-centenarian" to review the changes and improvements in medical science and art for the last fifty years; but, as implied in the title of the address, he uses this retrospect mainly to indicate the probable bearing of similar changes in the future. He believes that the time which is coming will be a period of progress, equally with that which has gone by; and that a judicious estimate of what has been done in the last fifty years will afford a good criterion of what may be accomplished in the next. No one knows better than himself, that a novelty is not always an acquisition; and that the new ideas or discoveries, sometimes in vogue, too often enjoy a short-lived popularity and then disappear forever. There have been many such failures in the past, and no doubt there will be others in the future. But when the improvements in any department of medicine have followed, on the whole, a particular course for half a century, it is reasonable to expect that the next fifty years will see them continued in the same direction. The possibilities of further development are by no means exhausted when we have reached the limit of our present opportunities; because other methods or combinations may at any time be discovered which will carry us at once by a new road far in advance of the old stopping-place. This is happily illustrated by Dr. Flint in the case of microscopic technology. The achromatic object-glass, which was practically completed in 1830, first gave us an instrument really serviceable in the examination of the tissues; so that it is fair to include, among the fruits of the last half century, the "creation of histology by means of the microscope." Improvements in the quality of the glasses, modes of illumination, width of angular aperture, immersion lenses, and the like, increased considerably the amplifying power and definition of the microscope. But these improvements were matters of detail, always restricted within certain limits; and it seemed as if little more could ever be accomplished by the aid of magnifying instruments, when, fifteen or sixteen years ago, a new era was inaugurated in histology by the use of *staining reagents*. "The process of staining, which has done so much for pathology, may be extended and applied to the study of the normal as well as morbid components of the body. It is a fact, significant as regards the future, that the use of dyes has brought into the range of vision objects which, without their use, the microscope fails to make visible."

The last half century has also seen what Dr. Flint calls its "crowning epoch" in the doctrine of the bacterial origin of disease. The growth of this doctrine forms a most interesting and instructive history, from the slow advances formerly made in the study of local and limited parasitic affections, the knowledge of minute cryptogamic vegetations and their part in the processes of putrefaction and fermentation, to its more recent and rapid development by the systematic cultivation and inoculation of microscopic organisms. Notwithstanding the temporary errors and uncertainties inseparable from so new a method of investigation, there can be no doubt that the idea of the propagation of infectious disease by living

germs is now firmly established in the minds of the medical profession. Dr. Flint fully believes in its reality and importance; and he anticipates from it a practical revolution in the treatment and prevention of many morbid affections. He regards it as a "demonstrated truth that the specific causes of certain of the infectious diseases are microorganisms." This definite and intelligible etiology will take the place of our former vague doctrine that diseases or epidemics may originate from incidental causes, or sometimes even spontaneously. Such an explanation can only be the expression of ignorance; because it overlooks the fact that "spontaneity is no more applicable to pathological conditions than to any other of the phenomena of nature." "It is a trite truism," says Dr. Flint, "to say that all effects have adequate causes. To say that a disease has a spontaneous origin is no less a solecism than to regard a waterfall as fortuitous, taking no account of gravitation." When we learn that a certain malady is caused by the introduction and development of specific germs from without, we have gained a most important item of information in the natural history of that disease. We have, furthermore, the surest guide for its successful treatment. In certain cases a parasiticide application will absolutely put an end to the disorder, by destroying the microscopic organisms which have caused it; and where this direct treatment is impracticable, may we not so modify the conditions of the system as to arrest the propagation and development of the foreign intruders?

But the greatest advantage to be expected from our knowledge of bacterial etiology is not in the cure of diseases after they have arisen, but in their prevention beforehand. "The destruction of organisms outside of the body by disinfectants, and by the removal of all the accessory conditions necessary to their existence, together with their effectual exclusion from the body, may, and indeed it is more than probable will, reduce the fatality from infectious diseases, in the order of Providence, much sooner than the discovery of effective therapeutic agents."

There is yet another method which promises still greater results in the control of infectious disease; that is, inoculation. We have long known, from a blind experience, that the poison of variola may be rendered less dangerous by inoculation; and we have all wondered how it could be, that so mild a contagion as vaccine should protect against the dreaded onset of smallpox. Now we know that the element of contagion, in both these maladies, is a microscopic germ. Moreover, the contagious organism of the vaccine lymph is specifically the same with that of smallpox. But it has been modified by passing through the system of the cow, so that it no longer produces in the human body the violent reactions which it would have excited originally. Nevertheless its specific character remains, and it is consequently a protection against its own recurrence in any form. Like a sour and knurly apple that has been planted and cultivated, in genial soil, till it has become mild and sweet, it is still the lineal descendant of its progenitor, and will reproduce its kind as before; but without the harsh and repugnant qualities which it formerly possessed.

The most active researches in the study of infectious disease, at the present time, have for their object the modification of specific virus by different methods of treatment and cultivation. Their results thus far may not be in a form to command universal acceptance; but they show the direction in which future progress is anticipated by many persistent

and enthusiastic investigators. Dr. Flint cordially recognizes the value of these labors and believes that they will bear fruit hereafter.

"There are present intimations," he says, "of important discoveries respecting inoculation with attenuated viruses and contagia, in order to forestall the development of infectious diseases. Here open up to the imagination the future triumphs of preventive medicine in respect to all classes of disease. The zeal and activity in this department of medicine often, in spite of obstacles arising from popular prejudice and indifference, redound to the glory of the medical profession."

Beside looking forward to the coming changes and improvements in medicine, the author indulges in some anticipations as to the future character and status of the physician. Following, as before, the history of the past, and taking into account the tendencies of the present, he finds reason to think that medical men in the next half-century will be still better acquainted than now with the natural history of disease, with its causes, variations, and limitations, and will rely upon this knowledge more than ever in their methods of treatment; and that the public will also reach a more just and enlightened appreciation of the medical art.

"It is a pleasant thought that hereafter the practice of medicine may not be so closely interwoven as hitherto, in the popular mind, with the use of drugs. The time may come when the visits of the physician will not, as a matter of course, involve the coöperation of the pharmacist; when medical prescriptions will be divested of all mystery and have no force in the way of fortifying the confidence of the patient. The medical profession will have reached a high ideal position when the physician, guided by his knowledge of diagnosis, the natural history of diseases, and existing therapeutic resources, may, with neither self-distrust nor the distrust of others, treat an acute disease by hygienic measures without potent medication."

No reader who takes up this short but instructive address, will lay it aside without following it to the end. It will give him an interesting retrospect of the past half-century, an agreeable entertainment for the present hour, and abundant food for reflection.

DICTIONARY OF PRACTICAL SURGERY, BY VARIOUS BRITISH HOSPITAL SURGEONS. Edited by CHRISTOPHER HEATH, F.R.C.S., Holme Professor of Clinical Surgery in University College, London; Surgeon to University College Hospital; Member of the Council and Court of Examiners of the Royal College of Surgeons of England. 8vo. pp. 825. Philadelphia: J. B. Lippincott Company, 1886.

OSTENSIBLY this work is intended for the busy general practitioner who desires immediate and concise information as to the diagnosis and treatment of emergency cases; but, in reality, its scope is much wider. For instance, the text on the subjects of lithotomy and lithotripsy by Mr. Cadge, really contains more information and actually occupies more space than the corresponding sections in most standard works on surgery. The absence of illustrations detracts somewhat from the usefulness of these articles as well as the almost complete absence of description of instru-

ments, but these are not usual in a work of this kind and their omission permits a greater expansion of the text. In addition to the articles on special subjects, general articles on deafness, diseases of the eye, skin diseases, etc., have been widely introduced, cross references being given whenever necessary.

A careful examination of this work enables us confidently to recommend it to our readers. Of course, we cannot endorse everything contained in the work, for in many points we differ greatly from the authors, but, taken as a whole, the work is full, accurate, and up to the times. It is only necessary to mention among the many eminent contributors such names as W. Marrant Baker, Richard Barwell, Marcus Beck, Edward Bellamy, Wm. Cadge, R. Brudenell Carter, Davies-Colley, Dyce Duckworth, Mr. Gamgee, Mr. Godlee, Mr. Hayward, Mr. Berkeley Hill, Sir James Paget, Sir William Mac Cormac, etc., to insure the acceptance of the correctness of our statement.

While from the scope of the work anything like an analytical review is out of the question, there are a few points which we desire to comment upon. For instance, in Mr. Stokes's description of Syme's amputation, he says that in those cases where there is much prominence of the heel the plantar incision "may" be "sloped toward the heel," and speaks of it as "this modification." Whether the heel be prominent or not, this should always be done more or less, and it is *not* a "modification" of Syme's original operation but a point upon which its originator lays especial stress.

These are Mr. Syme's own words with reference to this point: "the point of the knife is introduced immediately below the malleolar projection of the fibula, rather nearer its posterior than anterior edge, and then carried across the bone"—*i. e.*, calcis—"slightly inclining backward." In another place he mentions the necessity of this if the "heel be unusually prominent." In our opinion, it had better *always* be done to a greater or less extent, and the results will speak for themselves. Upon the other hand, most surgeons do not make the plantar incision in a Pirogoff amputation exactly the same as in a Syme's amputation for certain obvious reasons which we will presently give. As these two amputations are among the few which demand for their successful performance exactness and neatness, whatever renders them easy or difficult should be made specially clear for those inexperienced operators who will refer to this work in an emergency. This may seem a little point, but the unnecessary pulling upon and scoring of the cellular tissue caused by *not* sloping the incision toward the heel in a Syme's amputation is too often the cause of sloughing of the flap.

Upon the other hand, unless the plantar flap be sloped forward, away from the heel, and made a little longer on the inner side than upon the outer, the posterior tibial artery runs serious risk of being wounded. While this may not impair the vitality of the flap of a Syme's amputation, it certainly will that of a Pirogoff.

Among the many excellent sections we would specially call attention to those on "Septic Diseases," "Septicæmia," "Sapræmia," "Sepsis," and "Pyæmia." We wish that the limits of this review would admit of a more extended notice of their merits, but while the articles are full, they are in reality so concise as to admit of no further condensation without seriously impairing their lucidity, so that we can only advise our readers who are interested in this subject to study these sections for themselves.

The single article contributed by Sir James Paget on "Old Age" is, as one would expect, a model of its kind, clear, philosophic, and eminently suggestive. He calls attention to the fact that the generally accepted belief as to the danger of hemorrhage in the old is erroneous, unless the patient be very infirm or unsound. Anæsthetics, he considers, are well borne, but in strange contrast to the statement that elderly people are apt to have weak hearts, he prefers chloroform to ether, as less apt to excite bronchial irritation or pulmonary congestion. While these objections to the use of ether are, to a certain extent, valid, certainly in this country ether would be preferred on account of its non-depressing action upon the heart. Why the old should be less apt to suffer from septic poisoning or pyæmia we cannot understand, since in them the eliminative organs are so apt to be inefficient—notably the kidneys—which certainly in sapræmia seem to be the chief aids in the elimination of the poison. Coming from so eminent an authority, and doubtless the result of an extended personal experience, we can only accept it as a fact. It certainly must be explainable on different grounds from the well-known immunity from septic troubles the young enjoy, which is doubtless due to the healthy condition of all their tissues, especially those of the emunctories.

We could fill page after page with comments on the many good, and the fewer bad points of this work, but we must close with the earnest recommendation to our readers that they buy and read the book, feeling confident that our favorable judgment will not be reversed, provided the intentions and scope of the work are constantly kept in mind.

C. B. N.

HYPERALIMENTATION IN PHTHISIS.

DIE UEBERNÄHRUNG BEI DER LUNGENSCHWINDSUCHT. Von DR. E. PEIPER, Greifswald. (*Deutsches Archiv für klin. Med.*, 37 Bd. S. 377.)

HYPERALIMENTATION IN PHTHISIS. By DR. E. PEIPER.

USVOYENIYE I OBMEN AZOTISTUIKH VESHCHESTV PRI KORMLENII CHAKHOTOCHNUIKH PO SPOSOBU DEBOVE' A. By M. G. KURLOFF. (*Vratch*, No. 37, 1885.)

ASSIMILATION OF NITROGENOUS SUBSTANCES IN THE HYPERALIMENTATION OF PHTHISIS PATIENTS BY DEBOVE'S METHOD. By M. G. KURLOFF.

SINCE Debove's communication to the Medical Society of the Paris Hospitals, in November, 1881, in which brilliant results were described as having been obtained by the treatment of patients in advanced stages of phthisis by means of forcible feeding (*hyperalimentation*, *sur-alimentation*, or *gavage*), but little attention has been paid to his method by English and American physicians. Several communications on the subject, however, have from time to time appeared in Continental journals by Dujardin-Beaumetz, Mesnet, Desnos, Pennel, Broca and Wins, Schreiber, Ferrand, Bull, Voitoff, and by the two writers whose papers are named at the head of this article, and who seem to have

worked independently of one another, their papers being published about the same time.

Debove's system has for its object the restoration of the tissues, weakened by the disease, to their pristine condition, in which they are far less capable of acting as breeding ground for tubercle bacilli. This is accomplished by compelling the patient to take a large quantity of highly nutritious food, consisting of meat powder (prepared by drying finely minced meat on metal plates over the fire) suspended in lukewarm milk with the addition of eggs.

Dr. E. Peiper treated fourteen phthisis patients in the Greifswald Clinic with Debove's nutritive mixture. Some difficulty was experienced at first, owing to the objection of the patients to the stomach-tube. He then succeeded in persuading them all to swallow the food themselves. At first half a litre of milk, twenty-five grammes of meat powder, and several eggs were given at meal-times twice a day. These quantities were gradually increased, till from 200 to 300 grammes of meat powder were taken some four times a day, vegetables and wines were also given. Twelve of the patients increased from five to twenty-two pounds in weight. Cough and expectoration in all cases diminished, in five cases the night-sweats decreased, and in three more ceased. Gouty symptoms appeared in three cases.

Dr. M. G. Kurloff set before himself a much more difficult task than the mere repetition of Debove's clinical observation on the general improvement produced in phthisis patients by the method of forced feeding, though incidentally, as it were, his observations on this point accord with those of Debove, Peiper, and others. His main object, however, was to define the nature and extent of the change caused by hyperalimentation in the assimilation of nitrogen, both during the time the treatment was being carried out, and after it had been stopped. For this purpose he selected five undoubted cases of phthisis, all of whom suffered from want of appetite, diarrhœa, pyrexia, cough, and expectoration, which contained Koch's bacilli. The patients were first put upon the ordinary hospital diet, consisting of porridge for breakfast, soup with meat for dinner, soup for supper, and a daily allowance of "half-white bread." The composition of this diet was approximately known, and, therefore, a calculation could be made of the nitrogen ingested, analyses of the urine and feces giving the amount excreted.

"The data thus obtained were of course not novel, but merely confirmed the well-known fact that the quantity of nitrogen ingested by the body in phthisis is less than that excreted, the difference varying from day to day. In all cases, however, the nitrogen ingested and excreted by phthisis patients is far below the amounts observed in healthy persons."

Hyperalimentation was then commenced and continued for a period varying from six to eleven days. In some of the cases Debove's plan of introducing the food through a stomach-tube was adopted, no difficulty being found in passing the tube, as the pharynx was brushed over with a one per cent. solution of cocaine, which prevented the patients feeling the discomfort usual during the introduction of œsophageal instruments. This system of anesthetizing the pharynx with cocaine had also been made use of by another Russian observer, Dr. V. E. Nyeshel, who, in carrying out a series of investigations on digestion requiring the introduction of the stomach-tube, found that when he painted the pharynx with a five per cent. solution of chlorohydrate of cocaine a few minutes

before the introduction of the tube, the latter was swallowed easily and quickly, no unpleasant results being observed. (*Dissertation for Doctor's Degree*, St. Petersburg, March 31, 1885.)

Dr. Kurloff was, however, in some cases enabled to dispense with mechanical assistance altogether, the patients taking the nutrient mixture from tumblers. This mixture was composed of meat powder suspended in milk, the whole having a consistency somewhat greater than that of ordinary chocolate. The meat powder was not prepared precisely as in Debove's experiments, but was made from meat from which all the juice had been expressed, a waste product, in fact, in the manufacture of meat juice, and, consequently, an exceedingly economical source from which to obtain the meat powder. 700 cubic centimetres of this mixture were given at a time, 400 grammes of meat powder being thus administered in three or four doses during the twenty-four hours. As it averages 12.713 per cent. of nitrogen this quantity corresponds to about 1500 grammes, or nearly four *funts* ($3\frac{1}{2}$ pounds) of fresh meat, reckoning this to contain 3.4 per cent. nitrogen. (*Voit*.)

The minimum administered was about half this quantity. In addition, the patients were given as much milk as they could drink, which averaged 3200 c. cm., the maximum being 5200 and the minimum 1325 c. cm. Bread and biscuits were allowed according to the patient's desire. Generally, however, they took these only at the commencement, but afterward refused them entirely. Thus the mean quantity of nitrogen ingested was 54.154 grammes, corresponding to 1600 grammes of fresh meat, the maximum of nitrogen ingested being 80.687 grammes, corresponding to 2400 grammes, or more than $3\frac{1}{2}$ pounds, of fresh meat per diem.

"Under the influence of this enormous quantity of nitrogen the transformation of albumen in the body, and consequently the excretion of nitrogen with the urine, increased very considerably. Thus the urinary nitrogen excreted daily averaged about 34 grammes, the maximum being 56.26 grammes; while before the experiment, on the ordinary hospital diet the urinary nitrogen varied from 9 to 16 grammes, according to the condition of the appetite, fever, etc.

"With regard to the assimilation of nitrogen, that also increased decidedly, averaging 91 per cent. of that ingested, while previous to the experiment the amount assimilated varied from 76.7 to 88 per cent."

A table is also given showing that

"The quantity of nitrogen assimilated per kilogramme of body during the hyperalimentation increased more than threefold, and, moreover, on the days following the hyperalimentation it was somewhat larger than it had been previously to it. . . . The appetite of the patients, even after such a moderate continuance of the treatment as I employed, usually improved to a remarkable extent. They began to finish their diet ration and asked for more! . . . whereas previously they had scarcely been able to take the half of it. The increased quantity of food ingested added to the increased assimilation produced a rapid rise in the body weight amounting on the average to 420 grammes (about fifteen ounces) per diem. The increase of weight obtained persisted, as may be seen by some of the diagrams appended, some time after the hyperalimentation had ceased, and even continued to rise still higher."

In one of the cases only, which was that of a patient who was dying, the treatment did not succeed in arresting the rapid decrease of weight.

Generally during the treatment the patients felt better, the dyspnœa disappearing, the cough and expectoration diminishing, and the nocturnal

sweats being arrested. The temperature, also, showed a distinct tendency to decline. The semiliquid stools became firmer, except in the case of the dying patient and in that of another, where at first the diarrhœa increased, but stopped on the substitution of boiled for fresh milk, and, moreover, did not recur subsequently when a return was made to fresh milk. The only improvement in the physical signs was some diminution in the dry and moist râles.

The following cases will serve as examples of the observations conducted by the author:

CASE I.—S . . . noff, aged thirty-two years, trimming maker, weight on admission 39,250 grammes, of short stature, pale, feeble, greatly emaciated. No family history of phthisis. Distinct dulness in both apices, especially in the right, where bronchial breathing is heard with medium sized râles. These, however, are not universal and not very numerous. In the left apex the breathing is harsh and vesicular, and at times sibilant rhonchi are heard. Cough distressing and frequent. Expectoration slight, but containing multitudes of Koch's bacilli. Evening temperature 38.6° C. (101.3° F.). Appetite poor, semiliquid stools four or five times a day.

The patient was ordered to take the nutrient mixture, 200–250 grammes of meat powder and $2\frac{1}{2}$ litres of milk being given daily. This hyperalimentation was continued for eleven days, at the end of which time the body weight had increased 1600 grammes ($56\frac{1}{2}$ ounces). Before the commencement of the treatment, when the patient was on the ordinary hospital diet, he assimilated a mean percentage of 76.7 of the nitrogen ingested. During the hyperalimentation this rose to 85.4 per cent., and after it it fell to 75.5 per cent. for each kilog. of body weight. He assimilated before the hyperalimentation 0.32 gramme nitrogen, during it 0.93 gramme, and after it 0.33 gramme.

From the first day of the hyperalimentation, though the patient felt better, the diarrhœa increased, and was only checked on the ninth day by the substitution of boiled for fresh milk. All the time he felt exceedingly well, the cough almost ceased, the expectoration ceased, the temperature became normal, the violent sweats were arrested, and the man was able to sleep. Four days after the treatment was discontinued the weight was found to be still increasing, the appetite was still good, and the man felt so well and strong that he left the hospital in order to resume his usual work in the factory.

CASE IV.—P . . . tseff, Vasili, aged twenty-six years, painter. No family history of phthisis. Four years ago he had abdominal typhus, after which time he felt unwell, and became more than once an in-patient in hospital. The last time he was admitted into the Abukhoff hospital on the 27th of January, 1885, with wasting, general debility, loss of appetite, cough with expectoration, and exhausting night-sweats. On the 10th of March, by the kindness of the senior medical officer, Th. Herman, he was transferred to the clinic.

The skin and mucous membrane were pale, and there was but little subcutaneous fat. Distinct changes in both apices, with well-marked cavities in the left. Sputum nummulated, secreted in considerable quantity, and containing numbers of Koch's bacilli and elastic fibres. The weight of the patient before the treatment was subject to irregular fluctuations, but with a general tendency to fall.

After the time of the first hyperalimentation, which lasted six days, he felt exceedingly well, and had gained 3000 grammes ($40\frac{1}{2}$ ounces) in weight, the rise continuing even after the cessation of the treatment. Subsequently he again felt worse, the hæmoptysis returning, and continuing for three days. Nine days after the first trial of the treatment the hyperalimentation was again resorted to. Again he took for six days through the stomach-tube 300 grammes of powdered meat, and 4 litres of milk, and again he immediately felt better. The diarrhœa ceased, and he increased four kilog. (141 ounces) in weight. At the end of a week after the second course of hyperalimentation the patient

left the hospital confident that he was cured. His appetite had remarkably increased; his weight, however, did not remain as high as it had been, but began to fall again, though more slowly than after the first course of treatment.

The nitrogen assimilated at the time of the treatment was considerably increased, being 93.5 to 92 per cent., while previously, the other circumstances being the same, it varied from 82 to 86 per cent.

The writer concludes his interesting paper by pointing out that though the stage of enthusiasm for an indiscriminate application of this method of treatment may give place to its limitation to special classes of cases, still it must be acknowledged that we are by forced alimentation enabled in a very short length of time to accomplish that which should be the end of all treatment, the improvement of the weight and general condition of the patient, so that he has hopes that if the disease be thus attacked in its earliest stages a permanent cure may result.

As to the troublesome nature of the treatment, he remarks that all methods of treatment which are really valuable, such as sending patients away to places where the climate is suitable, or to koumiss establishments, involve a large amount of trouble, and he points out that French physicians have been able to carry out Debove's system with hospital patients so that the difficulties, to say nothing of the expense, are much less than those involved in climatic cures.

Of course, Dr. Kurloff's experiments would have been much more valuable if he could have kept the patients under observation for some weeks after the treatment, and if, too, he could have observed the results of prolonged treatment. He, Dr. Peiper, and others have, however, made out a very good case for the extension of the trial of the system to England and America, where, as we hinted before, it seems to be less known than it should be.

THE MODERN TREATMENT OF STONE IN THE BLADDER BY LITHOLAPAXY.

A DESCRIPTION OF THE OPERATION AND INSTRUMENTS, WITH CASES ILLUSTRATIVE OF THE DIFFICULTIES AND COMPLICATIONS MET WITH.

By P. J. FREYER, M.A., M.D., Bengal Medical Service; Civil Surgeon, Mussoorie. 8vo., pp. x. 116. London: J. & A. Churchill, 1886.

IF anything is gratifying to the leader of any great movement, it is to see the principles which he thinks true and important winning the confidence and support of others, and making way against the opposition which naturally arises against whatever is opposed to the general opinion. Such gratification has fallen in an unusual degree to the lot of Professor Bigelow, whose method of litholapaxy may be said to have revolutionized the treatment of stone in the bladder. This operation now seems to stand upon a secure footing, free from the weakness which would follow an exaggerated estimate of its applicability, and well defined in its indications and *technique*. This can be gathered from a study of what is going on all over the world, and it has recently been put into convincing and pleasing shape in the monograph of Dr. Freyer.

Dr. Freyer is an India surgeon, who, from a large and successful

experience in the operation of litholapaxy, has been led to commend it to his professional brethren in that country, and to give them a succinct account of its history, as well as of the manner of performing it. In respect to both these divisions of the subject, his book is most admirable. In discussing the former, it is the more interesting because it is somewhat controversial. The author has, with impartial pen, pointed out and corrected the mistakes which were made by Sir Henry Thompson in regard to the operation proposed by Professor Bigelow. The need for doing this is shown by the fact that Dr. Freyer himself was among those surgeons who were kept back from adopting Bigelow's operation because the great name of Sir Henry Thompson appeared against it. Dr. Freyer takes the opportunity afforded by the publication of his book to speak of the opposition of Sir Henry Thompson in a way which had proved too plain for the columns of the *Lancet*, which, publishing an article of his on the subject of litholapaxy, made such changes in it that the author describes it as "emasculated, and altered in such a manner that on publication it was scarcely known to the author." In the book before us he pays his debt at once to the *Lancet* and to Sir Henry Thompson, and sets down in clear, yet perfectly polite terms the truth in regard to the shortsighted opposition of the great English exponent of the operation of lithotrity to this new method, which even he has at length adopted. The steps of this opposition may be epitomized as follows: First, the proposition to use large instruments, and to complete the operation of lithotrity at one sitting was characterized as dangerous, and the instruments used were denounced as enormous and unwieldy, and as reminding Sir Henry of "the terrible engines used by Heurteloupe." Second, the originality of the idea was contested, and a claim made that Sir Henry himself had of late been doing something like Bigelow's operation. Third, the method of withdrawing the fragments by aspiration was belittled, and the apparatus recommended for this purpose was said to be only a modification of Clover's syringe, and in no sense an improvement upon it. The singular inconsistency of these opinions of Sir Henry Thompson is apparent on their face; their incorrectness has been demonstrated by experience, and by no one's experience more conclusively than by that of Sir Henry himself. To call attention to them does not seem to have been an especially agreeable task to our author, and in doing this he has kept entirely within the bounds of literary propriety and of general courtesy. But we share his opinion that it is right that it should be done, and his feeling that consideration for one surgeon should not require silence when injustice has been done to another. And, besides this, the temperate statement of such mistakes on the part of those who have become leaders in thought and practice has a salutary tendency to prevent their leadership from degenerating into despotism, and to support those who are *nullius in verba magistri*.

So much for the historical part of Dr. Freyer's book. In that in which he considers the merits and *technique* of the operation of litholapaxy, he is clear, interesting, and instructive. His experience has led him to offer some suggestions in regard to details of the operation which are sensible and likely to prove useful. In this connection it may be said that he has struck the happy mean in the citation of cases to illustrate his experience. There are none too many, and none too few. He has also called attention to what he calls "a new method of diagnosis of

stone." This consists in introducing a metal catheter into the bladder, and then injecting and aspirating a small quantity of water, in the hope that the current in the bladder will drive the calculus against the catheter, so as to produce an audible click. This method has been used with success in a number of cases by the author and by Mr. Harrison, of Liverpool. It was hit upon, as many good ideas are, by accident.

In regard to operations for stone in general, Dr. Freyer believes that litholapaxy is the operation for stones of moderate size, and even for those as large as three ounces, in adults. For children he prefers perineal lithotomy.

In conclusion, we can recommend this book as admirable in matter and in manner, and are happy to say that the share in its production borne by the publishers is appropriate to the excellence of its literary character.

C. W. D.

UEBER DIE TOPOGRAPHISCHEN VERHÄLTNISSE DES GENITALE EINER INTER PARTUM VERSTORBENEN PRIMIPARA. Nach einem Gefrierschnitte geschildert von DR. H. CHIARI, Professor der Pathologischen Anatomie an der deutschen Universität in Prag. Wien: Toeplitz & Deuticke, 1885.

ON THE TOPOGRAPHICAL RELATIONS OF THE GENITALS OF A PRIMIPARA WHO DIED DURING LABOR. Drawn from a frozen section by PROF. CHIARI.

As is now well known, our knowledge of the actual mechanism of labor has received its most important additions from the frozen sections of parturient women by Braune and Chiari; more especially that of the former. In Braune's section the uterus is made up of two parts, apparently quite distinct. The lower is canal-shaped, about four inches in all its diameters, bounded below by the rim of the os externum, and above by a ridge known as Braune's ostium internum; at the level of this ridge a large vein is also cut in the anterior and posterior uterine walls—the circular vein. According to Braune, therefore, this lower tube was cervical, and all above it uterine proper. This, however, has been doubted by many, and in the absence of microscopical examination it could not be definitely held that the whole of this tube was cervical, and did not, in its upper part, belong to the lower uterine segment.

In the present atlas Dr. Chiari, of Prague (not to be confounded with Professor Chiari, of Milan), has published sagittal mesial sections of a phthical woman who died during her first labor from pneumothorax. The sections drawn are: (1) Sagittal section mesial of the body, showing everything in section; (2) The right half of the section with the entire fetus in position; (3) The left half with the entire fetus in position, showing head in left occipito-anterior as rotated in second stage and membranes unruptured; (4) The right half; and (5) The left half of the body with the fetus removed.

The interest of this contribution centres in the careful microscopic examination Chiari has made of what we may term Braune's cervical canal. In Chiari's section, it is seen bounded above by the circular vein, and below by the os externum. Two additional facts are, however, shown, viz.: (1) A white, wavy line, evidently produced in the mem-

branes, running round the uterus, practically at the level of Braune's ostium internum; and (2) Persistence of the arbor vitæ in the lowest zone.

Microscopical examination of a strip of the anterior uterine wall, reaching from above the circular vein as far down as the vagina, revealed the following facts:

(1) The white thickened line already alluded to, was found to be due to a special folding of the chorion and decidua.

(2) The decidua was found to line the upper four centimetres of Braune's cervical canal, with chorion and amnion, easily separable, superimposed. The decidua was here quite thin, and, at the upper end of the arbor vitæ, was reduced to a few cells.

(3) Four centimetres below Braune's ostium internum the true cervical structure began, and thus the cervical canal proper was in this case only about 2-3 cm. long. The lowest portion (0.6 cm.) was covered with squamous epithelium.

(4) The uterine muscle was thinned out below the level of the circular vein, and down to the level of the arbor vitæ seemed to consist chiefly of longitudinal fibres.

The condition of the posterior wall of Braune's cervical canal was the same in Chiari's case as that of the anterior.

In his section, therefore, Chiari found *the upper two-thirds of Braune's cervical canal uterine, and only the lower third cervical*. He believes the upper two-thirds of Braune's cervical canal to belong to the lower uterine segment, in this following Schröder.

The importance of this proof cannot be overrated. The contraction-ring or furrow felt in threatened rupture of the uterus is now known to be in the lower uterine segment, while the commonest rupture of the uterus is also in this segment, and not in the cervical canal. The further bearings of this will no doubt be discussed by Kürtner in relation to his decidua cervicalis, and Dr. Braune will, doubtless, give his opinion in the matter.

Some special points now come up. It is remarkable that the wrinkling of the membranes is found only at the level of the contraction-ring, and not all over the uterine cavity; the head is synclitic, and the bladder is an abdominal organ, as we have already shown.

The value of Dr. Chiari's contribution is evident, and deserves the hearty thanks of all interested in scientific obstetrics. The execution of the plates is not first-rate; and no sections have been made showing the ureter relation. The atlas remains, however, the most valuable contribution to the subject since Braune's work.

D. B. H.

PRACTICAL CLINICAL LESSONS ON SYPHILIS AND THE GENITO-URINARY DISEASES. By FESSENDEN N. OTIS, M.D., Clinical Professor of Genito-Urinary Diseases in the College of Physicians and Surgeons, New York. New York: 1886.

THE present edition of this work is published by Professor Otis himself, owing to business embarrassments of the former publishers, and is intended to bridge over the hiatus between the first edition, which is

exhausted, and a second edition, which he has not had the time and opportunity to prepare; but which is promised in the near future. The rather pretentious title of the volume would imply that it was intended to be a complete treatise on the diseases of the genito-urinary organs; but this inference is emphatically disclaimed by the author. It seems to us that the term "The Venereal Diseases," would more accurately define the scope of a work which treats only of syphilis, chancroid, and gonorrhœa. Dr. Otis has been a frequent contributor to current medical literature, and his views are well known both at home and abroad. His most distinctive doctrines are in regard to the pathology of syphilis, the normal anatomy of the male urethra, and the treatment of stricture of the urethra; but he is a man of original ideas, and of great mechanical ingenuity, and the profession is his debtor in many respects.

The principal value of the work in hand is its practical clinical character. It is plain in language, but not particularly attractive in style.

The pathology of syphilis, as has been stated, is a subject upon which the author holds more or less distinctive views. He was one of the first to maintain that there is nothing mysterious or supernatural in the development of syphilis, but that it follows laws as definite as those of any other disease. In opposition to those who, like Billroth, believe that the "organism is infected at once," and that the disease is from the beginning "one of the blood," some intangible, mysterious principle having gained entrance into the system through the vascular apparatus at the moment of inoculation, Otis vigorously contends that the essential starting-point of the disease is a degraded cell or cells from a person who is suffering from syphilis. For the development of the disease, a breach of surface is requisite, to which the degraded cell gains entrance by direct inoculation. From this point it is taken up by the lymphatics and not by the bloodvessels, and now there occur a rapid cell growth and cell accumulation *in situ*, which constitute the induration of the sore, and about the same time the cells are arrested by the nearest lymphatic glands, which in turn become indurated and enlarged. Up to this time the process is a local one, the system has not been contaminated. Now the second incubation takes place, the cells are detained by the glands, but finally the proliferation increases to such an extent that the product is swept into the receptaculum chyli and thence into the general circulation. At this time secondary symptoms supervene. Notwithstanding the opinion of the author in regard to the disease being primarily local, he condemns as useless the excision of the initial lesion, as by the time the sore has become indurated, the glands will have become affected also. He believes that all the manifestations of syphilis are best explained by this theory of cell accumulation, and his views appear to be philosophical and correct. Applying these views to therapeutical methods, he says, page 116:

"Every variety of eruption . . . occurring between the second and seventh months after syphilitic inoculation may be said to have its cause in a localized cell accumulation beginning in a papilla cutis. For the elimination of this, a gentle persistent mercurial treatment is indicated, not only as the result of clinical experience but from the fact that it is *the remedy, par excellence, for inducing the fatty metamorphosis through which alone the cell accumulations, occurring during the acute stage of syphilis, can be removed.*"

The usual term tertiary syphilis is dispensed with, as the lesions occurring at late periods after infection are regarded as sequelæ, which are

non-essential, non-contagious, incapable of being transmitted, and are preventable. He makes the statement that in an experience of more than twenty years he has never found a case in which the lesions of the tertiary stage have proved contagious. In regard to the diagnosis of the initial lesion, he says :

"In summing up the whole matter, we are forced to confess that a final decision in any given case is not warranted until some other evidence is presented besides the appearance and character of the local lesion."

This opinion, whilst held pretty generally at the present time, is nevertheless worthy of repeated reiteration.

It is worthy of note that Professor Otis is a firm believer in the curability of syphilis ; and that under a persistent, long-continued mercurial medication in small doses, a cure is not only possible, but is to be expected. Syphilis is verily a more cheerful disease than it used to be.

The limitation of space compels us to omit notice of many points of interest, but we must pause a moment at the remarks on mediate contagion, page 291, as a source of urethritis. Who of us have not been gravely informed time and time again that the cause of the running was a complete enigma to the patient, unless he "caught it from a seat," and how often have we not assented to the possibility of this method of infection, simply as a placebo, to let the patient down easily, neither believing, nor being expected to believe the story? Dr. Otis now comes to the rescue of the above-mentioned prevaricators in these words: "I wish to state explicitly my conviction that gonorrhœa is occasionally contracted in this way." Copaiba and urethral injections are discarded by the author in favor of cleanliness, soaking the penis in hot water, and alkaline diluents, with a milk diet.

For the treatment of urethral strictures, dilating urethrotomy is recommended as being the only known means of effecting a radical cure. 2297 operations are reported without a death or permanent disability of any sort. We venture to think that the views of the author in regard to this operation are just a little too rose-colored. In this part of the world deaths have occurred, and strictures have recontracted ; nevertheless the results are generally satisfactory. In conclusion, we heartily commend Dr. Otis's volume to the favorable consideration of our professional brethren.

R. W.

DISEASES OF THE DIGESTIVE ORGANS IN INFANCY AND CHILDHOOD, WITH CHAPTERS ON THE INVESTIGATION OF DISEASE, AND ON THE GENERAL MANAGEMENT OF CHILDREN. By LOUIS STARR, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania, Physician to the Children's Hospital, Philadelphia, etc. With colored plate and other illustrations. 8vo. pp. 385. Philadelphia: P. Blakiston, Son & Co., 1886.

AMERICAN medical literature will lose none of the prestige already acquired in the department of diseases of children by the little volume which heads this notice. Dr. Starr's "Diseases of the Digestive Organs in Children," does not, perhaps, contain a great deal that is new, but it is a clear, concise, and thoroughly accurate exposition of existing knowl-

edge upon the subjects discussed. Its distinctive features are the consideration of certain diseases not usually treated in text-books on pediatrics, and the attention bestowed on the child's daily regimen, diet, clothing, bathing, etc., upon which the successful management of the diseases of young people so largely depends.

The book contains 585 octavo pages, divided into three parts, which treat respectively of "The Investigation of Disease," "Diseases of the Digestive Organs," and "The General Management of Children."

The opening chapter is a carefully prepared essay on the investigation of disease, is replete with practical suggestions, and will amply repay careful reading. The several affections of the stomach and intestines are considered in detail in Chapter II., Part II. The author questions the existence of what is usually termed simple indigestion or functional dyspepsia, and attributes all forms of disordered digestion to a distinct tissue lesion. "This may be and usually is a simple catarrh, but it is none the less a lesion." He would also abolish the familiar terms, simple and non-inflammatory diarrhœa, and substitute acute intestinal catarrh, holding the opinion that this disease is not functional in character, but depends upon a "distinct, though passing lesion—a hyperæmia or catarrh of the intestinal mucous membrane."

Cholera infantum is believed to be an inflammation of the gastro-intestinal mucous membrane, but there is, in addition, some involvement of the sympathetic nerves, leading to the transudation of serum into the intestines, and to alterations in the temperature, respiration, and other functions. "The nature of this is paralytic, so far as the intestine is concerned, and resembles in its results experimental section of the sympathetic nerves." The lesion is due in part to direct over-stimulation by the irritant contents of the canal and in part to nerve exhaustion from great atmospheric heat.

Intussusception, which, apart from fecal impaction, is practically the sole cause of intestinal obstruction in infancy, receives the careful consideration which its importance demands. The author, however, lays too much stress upon constipation as a symptom of intussusception, or, at any rate, does not emphasize the fact that a diarrhœa occasionally continues throughout the whole course of the malady. According to Treves, constipation is not a marked feature of more than thirty per cent. of the cases. Opium and belladonna preferably administered by the rectum, in doses large enough to relieve pain and check intestinal peristalsis are the only drugs worthy of trial. Mechanical interference can only be successful before adhesions have formed; in general terms, efforts at reduction are contraindicated after the fourth day of the attack, and even earlier should there be much tenderness over the seat of lesion.

Dr. Starr thinks there is very little good to be expected from laparotomy, but, on the contrary, by its performance the chance of recovery from separation of the strangulated intestine is lost. The statement is made here that laparotomy has been invariably fatal in the case of infants less than a year old. This is incorrect. There are recorded three successful operations upon patients aged respectively six, seven, and nine months. The well-known case of Prof. Sands was published in 1877.

About thirty pages are set apart for the consideration of the diseases of the liver. These are less frequently met with in childhood than in adult life; however, congestion of the liver is very common after the third year.

Of the structural diseases, fatty and amyloid degeneration are the most frequent; syphilitic disease, cirrhosis, tubercular deposit, and parenchymatous inflammation stand next in the order named, while echinococcus is very rare, and cancer almost unknown.

Both mild and dangerous types of icterus neonatorum are described. The mild form occurs in babes born prematurely or partially asphyxiated, or in those exposed to the depressing action of cold and other noxious influences. The manner in which these causes act to produce the disease is not known. The grave type depends upon congenital malformation of the bile-ducts and gall-bladder; compression of the bile-ducts by syphilitic inflammation and growths, and umbilical arteritis and phlebitis.

Part II. closes with a chapter on "The Affections of the Peritoneum," in which are discussed peritonitis, tubercular peritonitis, and ascites.

Part III. takes up in detail the general management of children, and is one of the most interesting and instructive features of the book. The feeding of infants, to which everything else is subordinate, consumes the larger portion of the chapter, and the reader will here find detailed schedules of diet for all ages from the newly born to the babe of eighteen months. The author is very partial to a mixture of cream, milk, sugar of milk, and water, varying the proportions according to the age. Condensed milk is considered an unsafe food upon which to rear a child. Infants fed upon it alone, though fat, are pale, lethargic and flabby, have little power to resist disease, and are likely to drift into rickets before the end of the first year.

The farinaceous preparations so popular with the public are not only bad foods, but have both directly and indirectly a deleterious effect upon the processes of nutrition. Milk partially peptonized by pancreatin is spoken of in high terms.

On page 339 we read as follows:

"There can be no doubt, though the statement is a bold one and seemingly contrary to nature, that, taking the average, infants properly brought up by hand are better developed and enjoy more perfect health than those completely breast-fed. Of course, there is no artificial food equal to the natural—the sound breast-milk of a robust woman—and a child fed upon this must thrive, if other circumstances be favorable.

"Unfortunately, the woman who has sufficient health and strength to furnish an abundant supply of good milk during the ten or twelve months of normal lactation is unique in our day, and the great bulk of those who do nurse their children grow pale, thin, and feeble, and give milk, which though sufficient in quantity to fill the suckling's stomach and satisfy the cravings of hunger, does not contain enough pabulum to meet the demands of nutrition. Such mothers complain that their children are puny, peevish, and always ailing, and wonder why their neighbors' babies, fed upon the bottle, are so round, jolly, and healthy. The explanation lies in the simple fact that good cow's milk is a better food than bad breast-milk."

Everyone will yield hearty assent to the closing paragraph, but certainly they are few who will not enter a strong protest against the teaching of the above quotation as a whole. The mother who is able to furnish her babe sound breast-milk in abundance may be *unique* in the author's field of labor, but she assuredly is not unique in Ohio. Recognizing the inestimable value of the mother's milk both in preventing gastro-intestinal diseases and in promoting the child's welfare in every way, we seriously object to the promulgation of any doctrine which will lessen in the estimation of the profession or laity the importance of

breast-feeding. It is undeniably true that there are babes who thrive best when the bottle is substituted for the breast, but these instances are exceptional, and it is not safe to formulate a rule of action upon the exceptions. We agree with the author that in the majority of instances it is better to rely upon intelligent and careful bottle-feeding than on a hired wet-nurse, so great is the difficulty of procuring one with the requisite moral and physical characters. But when an acceptable wet-nurse can be secured and retained, it certainly adds largely to the child's safety, especially in the summer months. W. J. C.

PESTE DE CADEIRAS OU EPIZOOTICA DE MARAJÓ, SUAS ANALOGIAS COM O BERI-BERI. Pello DR. J. B. DE LACERDA. Rio de Janeiro, 1885.

HIP PESTILENCE, OR MARAJÓ EPIZOOTIC; ITS ANALOGIES WITH BERI-BERI. By DR. J. B. LACERDA.

DR. LACERDA, Director of the Physiological Laboratory in Rio de Janeiro, during a visit to the island Marajó, studied an epizootic prevalent there among horses and pigs, called "Hip Pestilence" or "Straddles," and concluded that it was the same disease as beri-beri. The symptoms are debility, unevenness of gait, dilatation of nostrils, shortness of breath. These are followed by great restlessness, staggering, and inability to control the movements of the hind legs. Dysuria occurs, but there is seldom pyrexia, sometimes there is paralysis, and sometimes dropsy, which may affect the head, making it swell like hydrocephalus, or the abdomen or hind quarters. Ulcers may appear on the skin, and in all cases there is great emaciation. The proportion of atrophic cases is twenty per cent., of paralytic sixty per cent., the remaining twenty per cent. being of a mixed or indefinite type. The duration of the disease is very variable, some horses dying in four days after the first symptoms have appeared, and some lingering for several months.

With regard to the individuals attacked, neither sex nor age appears to exercise much effect, but it is said that domestic horses are more liable to the disease than those which are allowed to roam about at pleasure.

Thirty-three autopsies were conducted on horses, twenty-two of which had died of the disease, and the remaining eleven having been killed. The blood was altered, being dark and viscous; the spleen, liver, and kidneys were dark, swollen, and softened; the bladder and omentum presented numerous ecchymoses.

The medulla was carefully examined, sclerosis variously diffused being found. A number of peculiar groups of cells were also found in the medulla, which appeared to be the generative organs of some species of ascomycetes; mycelium was also seen.

In the water of Lake Arary, in the island, a polymorphous microphyte was found belonging to the group Ascomycetes, and with this, both in its natural condition and also after passing through various cultivations, Dr. Lacerda inoculated rabbits, pigs, birds, and monkeys; producing in all a disease very similar to the "hip pestilence" affecting the horses in the island; the post-mortem appearances also being strikingly like those presented by the horses. The blood in the two cases was also examined

by cultivation methods, similar phenomena being obtained. The author thus deduces the theory that the epizootic "hip pestilence" is due to the microphytes contained in the water of Lake Arary. He then enters into the question of the identity of beri-beri with this epizootic, giving a long table of the symptoms in the two cases, according to which the similarity appears to be very great. He also compares the results of post-mortem examinations, and afterward touches on the prophylactic measures which should be adopted against this terrible disease, the etiology of which he has been at such pains to elucidate.

The pamphlet is enriched by two photographs of fowls which have been inoculated or beri-beridized, as the author calls it, and by numerous excellent engravings of sections of the medulla, both macroscopic and microscopic, spores, mycelium, cultures in Van Tieghen's cell, etc. Being, however, written in Portuguese, it will hardly command the attention it deserves, unless translated into some language more universally read by scientific men.

RECENT WORKS ON THE CARE OF THE INSANE.

1. HANDBOOK FOR THE INSTRUCTION OF ATTENDANTS ON THE INSANE. 12mo. pp. 137. Boston: Cupples, Upham & Co., 1886.
2. HOW TO CARE FOR THE INSANE; A MANUAL FOR ATTENDANTS IN INSANE ASYLUMS. By WILLIAM D. GRANGER, M.D., First Assistant Physician, Buffalo State Asylum for the Insane, Buffalo, N. Y. 12mo. pp. 96. New York and London: G. P. Putnam's Sons.

THE number of insane under treatment in the asylums and hospitals of the United States and Canada is estimated to be 53,000, and it may be stated that no less than 4000 attendants are employed in their care. The selection of attendants is usually delegated to the chief medical officer, and, if not trammelled in the performance of this duty, it may be assumed he will be governed by some policy and have some standard of qualifications to which all will be expected to conform. The insane are removed from the surroundings of home, the attendance of the family physician, that personal care which, under other circumstances, friends would prefer to render, and new environments come to surround the patient, of which the attendants and the quality of their service form an important part.

The relation which a hospital assumes is in the nature of a confidential guardianship, and the physician regards it as one enhancing rather than lessening his usual responsibilities. The patient is in frequent contact and companionship with the hospital agents or attendants, who at the same time that they render personal service, execute the directions of the physician, and thus to a certain extent exercise a discretionary control over the ward. As the physician is not at all times in his wards and depends upon his attendants for certain information, they become his trusted agents and, as has been observed, "his eyes and ears." Every physician, therefore, recognizes the necessity of training attendants for their responsible duties. As he estimates the elements of a successful administration of a hospital, he will attach the greatest importance to

the creation of a corps of attendants imbued with a spirit of kindly sympathy, an intelligent appreciation of the conditions of those under their charge, trained to implicit conformity to the printed rules and regulations usually prepared for its government. If, in addition, the attendant is impressed and influenced by high moral convictions of duty, by the dignity and nobility of his calling, the physician is soon surrounded and assisted by agencies as essential and valuable as his medicines, and indispensable as fine tools to the skilled mechanic. How a high degree of training may be best imparted to attendants is a pressing problem with every manager and officer of a hospital. Every hospital is a school for training attendants, and every superintendent aims, in his own way, to produce the Ideal Good Attendant, who, as Dr. Ray has observed :

"Elevateth his employment by the manner in which he performeth its duties. Though offensive to the senses, or trying to the temper, or exhaustive of patience, as many of them are, yet he meeteth them all faithfully and promptly. Like every true man and true woman, he findeth that dignity inherent in every good work that ennobles even the meanest service. As the good artisan rejoiceth over some choice specimen of his craft wrought by his own hand, so doth the Good Attendant rejoice when, after much toil and trial, he seeth the mind of his patient coming out from under the cloud.

The two books before us are the outcome of efforts to instruct and train attendants by oral lectures. *The Handbook for the Instruction of Attendants* was prepared in 1884 by a Committee of the British Medico-Psychological Association, of which Dr. A. Campbell Clark, of Glasgow District Asylum, was chairman. As Dr. Clark had undertaken with great success, as he reports, to instruct his attendants of both sexes by oral lectures two and a half years previously, it may be inferred that the *Handbook* embodies the substance of the lectures he then delivered. It was submitted to the Association and received its approval. Thirty-eight pages are devoted to "The Body: Its General Functions and Disorders;" twenty-seven pages to "Nursing of the Sick;" twenty-six pages to "Mind and its Disorders;" twenty-three pages to "The Care of the Insane;" and sixteen pages to "The General Duties of Attendants."

How to Care for the Insane is a manual for the guidance of attendants in asylums, and embraces the lectures delivered by the author, who "began, in October, 1883, at the Buffalo State Asylum, a course of instruction to the women attendants upon their duties and how best to care for their patients. This has been regularly continued till it has become a fixed part of the asylum life." The contents embrace lectures on "The Nervous System and some of its Important Functions," "The Mind and some of its Functions," "Insanity, or Disease of the Mind," "The Duties of an Attendant," "General Care of the Insane," "Care of the Violent, Homicidal, Suicidal Insane, and Those Inclined to Violence," "Some of the Common Mental States and Accompanying Bodily Conditions," "Common Accidents Among the Insane," "Treatment of Emergencies," "Services Frequently Demanded of Attendants."

We have inserted at some length the contents of these volumes, and it gives us pleasure to commend the books and the sincere efforts the authors have made to elevate the standard of hospital service. They show the scope of instruction that may be imparted to nurses. The work and object of the authors will also receive the commendation and co-operation of officers and managers of hospitals, State officers, and the profession. The acquisition of knowledge alone, without the ability to

apply it intelligently, or a moral principle to give it character, will, however, not result in the production of the Ideal Good Attendant. It must be borne in mind that many of the greatest reforms and advances in the care of the insane have been accomplished by medical officers through moral force, example, bedside instruction, practical rules for the guidance of attendants to which they have exacted strict compliance.

The subject of training and instructing attendants is receiving increasing attention, as is shown by the establishment of schools in the McLean Asylum, Buffalo State Asylum, oral instruction in the Boston Lunatic Asylum, State Lunatic Asylum at Utica, Pennsylvania Hospital for the Insane, and recent discussions in the Association of Medical Officers of English and American Asylums. It may be a question in what manner the systematic training of attendants can be accomplished, and whether instruction by lectures alone can be relied upon to effect the best results. In the opinion of Dr. Cowles, of the McLean Asylum, who has given much thought to the subject, and whose reports from 1880-85 may be profitably consulted in this connection, a foundation must first be laid by giving class instruction and teaching special bedside and ward duties under the direction of a superintendent of nurses after the manner of a general hospital, while the lectures by physicians may more profitably follow. In other words, the school is the result of a process of gradual development. The school of the McLean Asylum was formally organized in Nov. 1882, as the result of tentative preparation begun in 1880, and may be said to be the first of the kind in this country.

Some of the chapters in each of these books might have been omitted, as the matter is more appropriate for a professional reader. It will hardly satisfy the physician, and is beyond the capacity of the attendant. It is of little importance to instruct attendants in the philosophy of the human mind, the nervous system, its functions or disorders, or about the doses, use, and effects of medicines. More space might have been allotted to instruction in the simplest duties of the attendant and nurse, and we shall hope to see these suggestions followed in further contributions to this subject which are promised.

J. B. C.

STUDIES IN PATHOLOGICAL ANATOMY. By FRANCIS DELA FIELD, M.D.,
Professor of Pathology and Practical Medicine. Volume II. Part 2. New
York: William Wood & Co., 1886.

ALL interested in the subject of pathological anatomy will welcome the above evidence of the continuation of Dr. Delafield's studies. The part just published contains twenty-seven plates (xiii.-xxxix.), which illustrate the subjects of chronic phthisis and lobar pneumonia. The great variety of lesions of the respiratory tract which may occur in the former affection are fully indicated. An objection may be made to the application of the term miliary tubercle to what is commonly considered a nodule of pneumonia, shown in Plate xxxiv. The plate following it, however, deserves the highest praise as an exquisite drawing of a thoroughly characteristic tubercle.

The last four plates are intended to demonstrate that in certain cases of acute lobar pneumonia an intra-alveolar formation of connective tissue

takes place within a short time. It has long been recognized that certain cases of pneumonia which present the clinical characteristics of the acute fibrinous variety do not end in a typical manner. The violence of the symptoms is lessened during and after the second week, but the evidences of pulmonary solidification and of constitutional disturbance persist for weeks and months. In the fatal cases a diffuse hepatization, of a gray or reddish-gray color, is found, and the alveoli frequently contain plugs of vascular granulation tissue. Dr. Delafield is of the opinion that such a change may take place within a few days after the invasion of the inflammatory process. His strongest evidence in favor of this view is that presented by Case II. and seen in Plate xxxviii. The history of the case indicates a pneumonia of at least fourteen days duration. The drawing shows a vascularized plug of connective tissue within the air spaces.

Of the various illustrations included in the series, the reproduced microphotographs are the least satisfactory. The drawings by the author are admirable in every respect, and will serve a useful purpose to all students of histology. Their story is duplicated by a few pages of text, but is so well told that reference to the latter is hardly necessary to those familiar with the subjects treated.

R. H. F.

BRIGHT'S DISEASE, AND ALLIED AFFECTIONS OF THE KIDNEYS. By CHARLES W. PURDY, M.D. Queen's University, Professor of Genito-Urinary and Renal Diseases in the Chicago Polyclinic, etc. 8vo. pp. 288, with 18 illustrations. Philadelphia: Lea Brothers & Co., 1886.

WE have before us a truly valuable book on the subjects treated; a book written modestly, yet with a confidence of assertion which shows that the author has himself handled cases and has studied them to some purpose, while he also exhibits a knowledge of the work of others. The volume claims to be a systematic, practical, and concise description of the pathology and treatment of the chief organic diseases of the kidneys associated with albuminuria. Such it is, including albuminuria, uræmia, acute nephritis, cirrhosis of the kidney, scarlatinal nephritis, lardaceous degeneration, and cyanotic induration of the kidney. It differs from most other works on the same subject in devoting a separate chapter to scarlatinal nephritis instead of considering it under the head of acute nephritis due to a special cause—the scarlatinal poison. Such an arrangement has in its favor the fact that especial attention is thereby attracted to a grave complication of scarlet fever which is too often lost sight of until it has established itself in the case. On the other hand, he who reads the chapter on scarlatinal nephritis and that on acute nephritis must necessarily read much matter twice over. It is a question, therefore, whether a separate chapter on scarlatinal nephritis is justified, since the disease may be said to give us the type of an acute nephritis.

It is not so with puerperal nephritis which, while not a distinct form of nephritis, is not nearly so constant in its morbid product and has not

a clinical history which can be regarded as typical for acute nephritis. The chapter is, therefore, well included.

Dr. Purdy abandons the terms parenchymatous nephritis and tubal nephritis, heretofore used to indicate that form of acute and chronic inflammation of the kidney in which the cells lining the tubules are the primary and principal seat of the inflammatory process; also the term interstitial nephritis, heretofore applied to the form in which the inflammatory process resides chiefly in the interstitial tissue, the tubules and their cellular lining being only secondarily involved. We incline to think that the author has come to regard this course as the best, because his studies, while they have included the morbid anatomy of the disease, have been rather more from the clinical standpoint. And although we admit it is not always easy to draw the line, clinically speaking, between processes that are parenchymatous and processes that are interstitial, yet so long as such differences exist the use of the adjective terms tends to greater accuracy. We do not overlook the fact that what is commonly called chronic parenchymatous nephritis is rarely confined to the parenchyma of the organ, and think it would be at once more accurate and less confusing to use the term chronic *diffuse* nephritis for this process. Although, too, the processes resulting in cirrhosis of the kidney may lack some of the features which are essential to inflammation, we still think that modern pathologists are correct in regarding them as inflammatory, and we therefore think that the terms chronic interstitial nephritis and chronic interstitial hepatitis are well retained, especially as there occur in both organs acute inflammatory processes, also interstitial, resulting in suppuration. We miss, too, our old friend the term "large white kidney," for one of the products of chronic nephritis, but whether this is an intentional omission or an accidental one we do not know.

To proceed to note systematically some of the features of the treatise, Dr. Purdy first takes up in Chapter I., Albuminuria, which he divides into (a) extra-renal or false albuminuria, and (b) renal or true albuminuria. Here we have at once a slight fault to find in behalf of accuracy, and that is with the term "false" albuminuria. What he calls "false" albuminuria is as much albuminuria as what he calls "true" albuminuria, the only difference being that the source of the albumen is not the same. The author does not place much stress upon the distinction of the imperfect albumens, peptone, and hemi-albuminose from true albumens, and in this we believe he is right. We are inclined to believe that the recent attempts to differentiate the tests between these substances, and between mucus and albumen have been in some respects rather confusing than otherwise.

The causes of albuminuria are put down as (a) alterations in the blood pressure, (b) changes in the vascular tunics, (c) degeneration of the renal epithelium, (d) alteration in the composition of the blood. Each of these causes is fairly discussed and its significance pointed out, and the conclusion arrived at, that aside from persistence or large amount of albumen in the urine, it is impossible to predict with any degree of certainty, from the character of the albuminuria, its relative degree of gravity. A very fair consideration is given to the various delicate tests for albumen which have recently attracted much attention, and of them Dr. Purdy regards as most sensitive the potassio-mercuric iodide, and picric acid; next in order, heat, ferrocyanide of potassium, and nitric acid in the cold.

The most reliable are the ferrocyanic, and nitric by Heller's method. He further makes this important statement: "I know of no test for albumen in the urine which, under some circumstances, has not misled the observer," whence the importance of submitting the urine, when doubt arises, to each of the five tests, and in testing urine for the first time to employ at least two tests.

In speaking of casts, attention is called to a fact which is constantly overlooked in practice, that they are rarely found in alkaline urine, being readily soluble in it. Hence the importance of having fresh specimens of urine for testing and in testing them promptly.

Passing, in Chapter II., to the important subject of uræmia and its causes, Dr. Purdy rejects all of the exclusive theories which would ascribe it to any single agency, but refers it rather to the combined action of several constituents of the urine. The temperature in acute uræmia, upon which there has recently been some discussion, is put down at from 101° F. to 105° F., and "the pupils may be dilated but never contracted." Among what may be regarded as novelties of treatment is the subcarbonate of iron in chronic uræmia, to which the author some time ago called attention in a paper, and attaches great value. He prescribes it in doses of twenty to thirty grains every three hours. It usually rapidly relieves the headache, nausea, and other symptoms, "possibly acting as an oxidizing agent on the effete material with which the blood is surcharged." His second method of modifying the uræmic influence is by simply diluting the blood by copious draughts of fluid, which not only renders the toxic agencies less harmful, but also favors filtration and diuresis. Dry hot-air baths are preferred to steam baths and to jaborandi for promoting sweating. Dr. Purdy fears the tendency of pilocarpine to produce œdema of the lungs, but this effect may be removed by the hypodermatic use of atropine in doses of $\frac{1}{100}$ th to $\frac{1}{60}$ th of a grain. Muscarine is another new remedy recommended for its action on the bowels and its stimulating effect on the pancreas, liver, salivary glands, and skin. Its dose is from one-eighth to two grains, and it may be given subcutaneously or by the stomach.

In Chapter III. acute nephritis is defined (p. 92) as "an essentially acute inflammation, involving the whole glandular structure or cortex." The changes in the connective tissue of the organ are comparatively slight, requiring more time for their development; yet even here the increased nuclei of young connective tissue-cells are sufficiently observable, especially around the capsule of Bowman. In the treatment of acute nephritis, rest to the inflamed organs and limitation of the damage to them are the principal indications. The former is accomplished by rest in bed, and dietetic measures which consist in the exclusion of nitrogenous food as far as possible. For the first three or four days plain water gruel made with arrowroot or barley meal. Even milk and bread are excluded at first, while turnips are admitted, as a part of the dietary of Dr. Aufrecht, but we think they are better omitted. Saline cathartics in moderation, with digitalis as a diuretic, and alkaline solutions, with a view to dissolving the obstructive plugs coagulating in the uriniferous tubules, are the drugs preferred. Citrate of potassium is the alkali preferred, in doses of from \mathfrak{zj} to $3j$, largely diluted, and repeated every two to five hours.

Chapter IV. is devoted to chronic nephritis. Passing directly to treatment, tannate of sodium, fuchsin, ergot, and tannic and gallic acids are recommended with a view to their effect in diminishing albuminuria

—we think with rather more favor than they deserve. Among the newer remedies is the fluid extract of *adonis vernalis*, which “in ten drop doses often adds remarkably to the action of *digitalis*,” and “*convallaria majallis* may be substituted occasionally for either or both of them.” *Apocynum cannabinum* is also spoken of as an efficient diuretic, and in these cases the author has known “it to stimulate enormously the secretion of urine, although in the doses requisite to obtain its more active diuretic effects it often produces sharp purgation, and even vomiting.” The dose is from five to twenty drops of the fluid extract. Dr. Purdy has also used the chloride of gold in the late stages of chronic nephritis, in a number of cases with good results.

Passing on to cirrhosis of the kidney in Chapter V., epistaxis, occipital headache, diarrhoea, and cirrhosis of the liver, are symptoms named in addition to those more commonly mentioned. Dr. Purdy has noted that the stools in this form of diarrhoea are most frequent at night, corresponding in this respect with the largest passage of urine. The dyspnoea more or less characteristic of the advanced stages of the disease, is ascribed to three causes, nervous manifestation of uræmic origin, *œdema pulmonis*, and a dilated and weakened condition of the heart. With regard to the use of the nitrites which have come to be regarded as valuable remedies in relieving the high vascular tension characteristic of this disease, and the symptoms growing out of it, Dr. Purdy is satisfied that they are of great value. He prefers the nitrites of sodium and potassium to nitroglycerine, as they are less likely to produce headache, and their action continues much longer. They are given in doses of from three to five grains every four or five hours.

Scarlatinal nephritis is considered in Chapter VI. In speaking of the “smoky hue” of the urine in “scarlatinal nephritis,” the author assigns a different cause from that commonly assigned to this symptom. He says it is owing to the presence of “undissolved urates and organic débris.” We have always regarded it as the result of the acid reaction of the urine on a small amount of blood, the same bloody urine when alkaline usually becoming decidedly red.

Chapter VII., on puerperal nephritis, is a very useful one, and lardaceous disease and cyanotic induration are considered with sufficient fulness in Chapters VIII. and IX.

These are some of the points it has occurred to us to note in a careful perusal of this book—by which it may be said to be distinguished from existing works on the same subject. It will be seen that Dr. Purdy has enlarged the therapeutics of Bright's disease, the field in which we at present most need light, although some of the remedies suggested have yet to bear the test of time. He has unquestionably added to our knowledge of the subject, and English-reading practitioners everywhere will welcome his book. It is well printed in large, distinct type, by which the pleasure of reading is in no slight degree enhanced.

J. T.

A MANUAL OF PRACTICAL THERAPEUTICS. CONSIDERED WITH REFERENCE TO ARTICLES OF THE MATERIA MEDICA. By EDWARD JOHN WARING, C.I.E., M.D., F.P.C.P. London. Edited by DUDLEY W. BUXTON, M.D., B.S. Fourth edition. 12mo. pp. xxix. 666. Philadelphia: P. Blakiston, Son & Co., 1886.

SINCE the first edition of this work appeared thirty-two years ago, it has met with well-merited favor. The third edition was published in 1874, and became out of print in 1880. The present volume differs somewhat in the arrangement of the contents from the preceding editions, and considerable matter has been omitted. Many new remedies have, however, been added, and the volume is presented in a more concise and convenient form. The book is essentially a "Practical Therapeutics." The space devoted to the consideration of the physiological action of drugs is short; though sufficient for the needs of most practitioners. The treatment of the therapeutical uses of drugs is concise, but thorough. The rules for the administration of different medicines, as of arsenic, mercury, opium, etc., and the indications for their use are excellent.

The articles on cocaine and antipyrin contain about all that is, at present, known of these interesting drugs. As an antipyretic, antipyrin is recommended to be administered in twenty-five grain doses every hour for three hours; and its hypodermatic use is also suggested. Sufficient caution is not given, however, regarding the dangers attending the use of antipyrin.

There are good articles on mineral waters, leeches, and pepsin; though the dose of pepsin, 2-5 grains, seems ridiculously small. It is, however, mentioned that Dr. H. C. Wood advises the use of much larger doses.

There is a useful discussion on the administration of salicylate of sodium in acute rheumatism. Thirty grain doses are advised every two hours until the temperature falls, and the administration of the drug is to be continued for a week or more after complete defervescence.

In conclusion, it can be said that we know of no book from which the medical student can better acquire a concise knowledge of practical therapeutics, than from the volume under consideration. C. B. P.

VORLESUNGEN UEBER ORTHOPÆDISCHE CHIRURGIE UND GELENKKRANKHEITEN. Von DR. LEWIS A. SAYRE, etc. Zweite sehr erweiterte Auflage. Autorisirte Deutsche Ausgabe. Von DR. F. DUMONT. Mit 265 Holzschnitten. Large 8vo. xvi. pp. 396. Wiesbad: J. F. Bergmann, 1886.

LECTURES ON ORTHOPÆDIC SURGERY AND JOINT DISEASES. By LEWIS A. SAYRE. Authorized German edition, by DR. F. DUMONT, etc.

SAYRE'S work on orthopædics is too well known and too well established to require comment in bringing to the notice of the readers of this journal the fact that it has recently been translated into German. We congratulate the author upon this evidence of the appreciation of his work which is felt in Germany, and the translator upon the excellent way in which the translation has been made. C. W. D.

QUARTERLY SUMMARY

OF THE

PROGRESS OF MEDICAL SCIENCE.

A N A T O M Y .

UNDER THE CHARGE OF

GEORGE D. THANE, M.R.C.S. ENG.,
PROFESSOR OF ANATOMY AT UNIVERSITY COLLEGE, LONDON.

THE SHORT MUSCLES OF THE THUMB AND LITTLE FINGER.

H. ST. JOHN BROOKS finds that the outer head of the flexor brevis pollicis muscle most frequently receives branches from both the median and the ulnar nerves. The following table shows the variations in the nerve supply of this muscle in 31 dissections: outer head supplied by deep branch of ulnar alone, 5 cases; outer head supplied by ulnar and median, 19 cases; outer head by median, inner head by ulnar, 5 cases; outer head by median, inner head by median and ulnar, 2 cases.

The same anatomist shows, from a comparison of the muscles in a considerable number of mammals, and from their relation to the deep part of the ulnar nerve, that the muscle known as the flexor brevis minimi digiti in human anatomy, and the larger part of the opponens minimi digiti, are derived from Cunningham's superficial or adductor layer, while the ulnar head of the true flexor brevis is only represented by a part of the opponens beneath the deep branch of the ulnar nerve; the radial head of the flexor brevis forms the third palmar interosseous muscle. The so-called deep head of the flexor brevis pollicis is really a part of the adductor, and the proper ulnar head of the short flexor is the first palmar interosseous of Henle. The separation and reduction of some of their parts, shown by these muscles, is attributed to the pressure of the more developed long flexor tendons in the higher mammals.—*Journal of Anatomy*, July, 1886.

ON THE CENTRAL CONNECTIONS OF THE AUDITORY NERVE.

BENNO BAGINSKY has studied the origin and central course of the auditory portion of the eighth nerve in the rabbit by observing the degenerations following destruction of the cochlea in young animals. He contrived an operation by which the cochlea was completely destroyed, while the other parts of the labyrinth remained intact, and found that the resulting degenerative changes affected solely the hinder root of the auditory nerve, the anterior root being unaltered. The fibres of the posterior root are thus shown to have

no connection with the inner and outer auditory nuclei, but to spring in part from the anterior or accessory auditory nucleus and the tuberculum laterale of Stieda, and in part to course round the restiform body into the arcuate fibres of the medulla oblongata. Other fibres appear to pass through the corpus trapezoides to the superior olive of the same side. Having crossed the mesial plane the auditory fibres are found in the lower fillet of the opposite side, running to the inferior quadrigeminal and internal geniculate bodies, which are believed to be related to the auditory nerve in the same way as the superior quadrigeminal and external geniculate bodies are to the optic nerve. No changes were found above the mesencephalon in the cerebrum, or in the cerebellum and its inferior peduncle.—*Virchow's Archiv*, July, 1886.

ON THE SKIN OF THE EXTERNAL AUDITORY MEATUS.

The skin lining the deepest part of the external auditory meatus is generally described as presenting papillæ disposed more or less regularly in longitudinal rows. This statement is corrected by E. KAUFFMANN, who demonstrates that the prominences seen in frontal sections of the meatus are caused by fine ridges of the cutis, running transversely to the axis of the canal and parallel to the margin of the tympanic membrane. The ridges are most numerous on the floor of the meatus, less frequent in the roof, and disappear on the anterior and posterior wall. Only exceptionally are a few small papillæ found projecting from some of the ridges. The ridges first make their appearance between the fourth and fifth month of fetal life, and they appear to become less marked in old age.—*Wiener Jahrbücher*, July, 1886.

THE ADENOID TISSUE OF THE PITUITARY MEMBRANE.

E. ZUCKERKANDL discusses the adenoid tissue of the nasal mucous membrane, of which he considers it a normal, although exceedingly variable, constituent in man. The occurrence of a scanty infiltration of the mucous membrane with lymphoid cells is regular, but masses of adenoid tissue, either in the form of diffuse infiltration or follicles, are exceptional.

The adenoid tissue is found most abundantly in the respiratory division of the nose, and especially in its hinder part. In the olfactory region the connective tissue of the mucous membrane contains interspersed lymphoid cells, but no follicles. Adenoid tissue, both diffuse and forming follicles, is well developed in the pituitary membrane of the dog, cat, sheep, pig, stag, and hare, in all of which follicles are more numerous and constant than in man.—*Wiener Jahrbücher*, July, 1886.

ON THE POSITION OF THE PELVIC ORGANS IN THE FEMALE.

A. WALDEYER concludes, from his observations on some twenty nulliparæ between the ages of fifteen and thirty, that the normal position of the female pelvic organs is that described by His and B. S. Schultze. The uterus is inclined forward, resting against the bladder, and being more or less sharply bent at the level of the internal os according to the degree of distention of the bladder, the cervical portion is relatively fixed, while the body is freely movable. In no case was intestine found between the uterus and bladder; the recto-uterine pouch is occupied by a part of the sigmoid flexure, and less

frequently also by small intestine. The broad ligament is in the upright posture nearly horizontal. A deviation of the uterus to one side, more frequently to the left, is very common, and is probably a temporary condition. The flexion of the uterus is less marked in children than adults, depending on the relatively less capacious pelvis. The ovaries lie against the side wall of the pelvis, a little behind the middle of the ilio-pectineal line, having their long axis nearly vertical, the hilus-border directed forward and outward, and the surfaces looking inward and outward. The ampullary portion of the Fallopian tube forms a loop over the ovary, and the latter organ is almost entirely concealed by a curtain-like fold of the broad ligament.

The contracted bladder is in the adult entirely behind the symphysis pubis, and is much flattened on its upper aspect in comparison with the male organ. The ureters lie against the side wall of the pelvis close below the ovaries, very near to the hilus. The projecting fold of peritoneum which runs across from side to side over the empty bladder, and which is shown to exist also in the adult female, is named by Waldeyer *plica vesicalis transversa*.—*Anatomischer Anzeiger*, June 15, 1886.

J. SYMINGTON publishes some valuable observations, with figures, upon the position of the uterus and ovaries in the child, as ascertained by frozen sections. He finds that in the fœtus and newly born infant the whole of the anterior surface of the uterus is in close contact with the bladder, and that the axes of the uterus and vagina form a very obtuse angle, open forward. In a child of two months, in which the bladder was empty, the uterus was straight, and intestine lay in the vesico-uterine pouch. A mesial section from a child of fifteen months shows how the uterus is pushed backward by a distended bladder. In a girl six years old, the upper surface of the empty bladder is concave, and its posterior surface is in relation with the cervix of the uterus and the upper part of the vagina; the axis of the uterus is straight; in this case there is a considerable quantity of fluid in the lower part of the abdominal cavity, which has carried up the intestine away from the uterus. In a girl of thirteen years, the uterus is almost straight and strongly anteverted, being closely applied to the nearly empty bladder. The author believes that the view that the uterus is normally anteflexed in the infant is erroneous, and that it is less anteverted in the child than in the adult.

Concerning the position of the ovary, Symington agrees with Waldeyer, and points out that the organ is not normally fixed, but possesses a considerable range of mobility, alterations being mainly due to change in the uterine position. The uterus does not undergo any marked increase in size between infancy and puberty. The period at which the arbor vitæ disappears from the body of the uterus is variable; in one case it was still well marked at thirteen years.—*Edinburgh Medical Journal*, July, 1886.

MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.

UNDER THE CHARGE OF

ROBERTS BARTHOLOW, M.D., LL.D.,

PROFESSOR OF MATERIA MEDICA, GENERAL THERAPEUTICS, AND HYGIENE IN JEFFERSON MEDICAL COLLEGE,
PHILADELPHIA.

A NEW ALKALOID—HYDROCHLORATE OF TULIPIFERINE.

In the last quarterly issue (June, 1886) of the *Drugs and Medicines of North America*, a full account of *Liriodendron tulipifera*, in its botanical, chemical, and pharmacological aspects, is given. An alkaloid has been obtained from it by PROF. J. M. LLOYD, to which he has assigned the name *tulipiferine*. *Liriodendrine*, as Prof. Lloyd says, would be more in harmony with the present method of naming alkaloids, but unfortunately, Emmet, in 1831 (*Journal of Pharmacy*, p. 5), gave the name *liriodendrine* to the resin, under which name it has been, and still is, known.

DR. BARTHOLOW, of Philadelphia, in the same issue, reports a physiological investigation of the hydrochlorate of tulipiferine prepared by Prof. Lloyd. We give an abstract of this physiological study for such of our readers as may be interested in the revival of an old remedy, and familiar with the use, in domestic practice, of the bark of the tulip tree.

The alkaloid tulipiferine is not a very active substance, but it is by no means inert. An eighth of a grain of the hydrochlorate affects frogs, and one grain, rabbits. The results of its action in general are these: it causes paresis, muscular trembling, convulsions, partly clonic, partly tonic in character, heightened cutaneous and ocular reflexes, followed by stupor, increasing paralysis, and finally complete suspension of motility and sensibility. When, in frogs, all the phenomena of life have apparently ceased, if the chest be opened the heart is found in slow but rhythmical and sustained action. In one experiment this was found to be the case after twenty-four hours of apparent somatic death. As regards the nature of the action on the heart, it was ascertained that, as the effect of the alkaloid deepened, the vagus became less and less excitable on faradic stimulation, but it was not until the action reached its maximum that the nerve ceased to respond. The cardiac motor ganglia and the muscular tissue of the heart, however, continue responsive to irritation up to the period of physiological death.

As respects the action of tulipiferine on the peripheral nerves, it is found to lessen but never entirely destroy the irritability of the motor and sensory nerves. The muscles remain unaffected and contract on stimulation so long as any manifestations of vital action remain.

Tulipiferine, as the convulsive phenomena rather indicate (by removing inhibition), has some action on the brain. In warm-blooded animals a soporose state deepening into coma occurs from the exhibition of a full dose.

The physiological actions of tulipiferine indicate the possession of therapeutical properties by the bark of the tulip tree. In Rush's time it was reputed to be tonic and antiperiodic. It has, however, since been rarely employed except in domestic practice. During the late war Southern

physicians resorted to it as an antiperiodic owing to the scarcity of cinchona, yet it was not depended on alone, but combined with willow, dogwood, and other barks having similar properties. (Porcher, *Resources of the Southern Fields and Forests*.) From the physiological study we may conclude that liriodendrine will prove useful as a tonic, in cases characterized by cardiac weakness more especially.

THE PHYSIOLOGICAL ACTION OF THE PEPTONES AND ALBUMOSES.

But a few years ago it was discovered by Schmidt-Mülheim that *peptone* injected into the veins of an animal causes deep narcosis, fall in the blood-pressure, and a condition like asphyxia. It was also found that it delayed the coagulation of the blood. Subsequent researches, especially by Kühne, brought to light the fact that the substance supposed to be peptone is really a mixture of peptones and albumoses. Such was the state of our knowledge on this subject when POLLITZER (*Journal of Physiology*, June, 1886, vol. vii. No. 3) undertook an investigation in the Physiological Institute of Heidelberg, to ascertain whether the effects attributed to peptones were due to them or to albumoses.

Pollitzer found that all the substances used in the experiments, excepting anti-peptone—the peptones and albumoses—“exercised without fail a strong narcotic action.” A stage of excitement lasting one or two minutes precedes the narcosis, which is like that produced by chloroform, and is very profound, but motility remains unaffected and the reflexes are not abolished. The peptones, except anti-peptone, and the albumoses have, in varying degree, the property of retarding, sometimes of preventing the coagulation of the blood. They all lower the blood-pressure remarkably. It has been suggested that the narcosis is due to anæmia of the brain, since it lasts only so long as the blood-pressure is below normal. This lowering of the vascular tension is due to vasomotor paralysis, and this chiefly in the splanchnic region, as is shown by the extreme congestion of the mesenteric vessels. Although this subject is a physiological one, it is probable that these facts will have an important relation to certain therapeutical problems.

MILK AND ITS THERAPEUTICAL APPLICATIONS.

Apropos of peptones, it may be useful to our readers to present a brief synopsis of DUJARDIN-BEAUMETZ'S views regarding milk and its therapeutical employment. In his “Therapeutic Conferences,” now in course of delivery at the Cochin Hospital (*Bull. Gén. de Thérap.*, July 15, 1886), he offers some practical suggestions which, although not new, may, nevertheless, be useful to many. As regards the contamination of milk, he holds that medicaments and poisons contained in plants pass in great part into the milk. In this way the alkaloids of the solanaceæ may render milk poisonous. That iodide of potassium and the iodides generally, salicylic acid, arsenic, etc., may thus contaminate the milk of nursing mothers is certain. Brouardel and Pouchet have communicated to the Medico-Legal Society an instance in which the death of an infant was occasioned by arsenic in the milk of the mother, who was taking large doses medicinally. Syphilized infants have been treated through the milk with mercury by administering mercurial

preparations to the nursing mother. In this way also quinine has been successfully given to an infant suffering from intermittent fever.

If medicaments may be thus transmitted, why not the poisons of typhoid, tuberculosis, and syphilis? As regards the typhoid poison, he thinks the water added to the milk is the vehicle rather than the milk itself. There can be no doubt that the bacilli of tuberculosis are contained in the milk of tuberculous cows in large numbers, but it is not proved that in this way the human subject is affected.

Dujardin-Beaumetz then passes in review various milk products, as whey and cheese, and next considers certain drinks obtained by fermentation. *Kefyr* is prepared in the mountains of Caucasus, and consists of cows' milk which has undergone fermentation by the addition to it of *kefyr grains*, which consist of a microbe—*dispora Caucasica*—that has the remarkable property of transforming lactose of milk into alcohol and carbonic acid. *Oidium lactis*, on the other hand, changes lactose into lactic acid merely.

Under the name *Galazyme*, Schneep has described a fermented milk which is prepared by the addition of sugar and a special ferment. Various modifications of this process have been proposed, consisting for the most part in the addition of different kinds of sugar and brewer's yeast. The *koumiss*, so-called, which is now so commonly dispensed in this country, is nothing more than Schneep's galazyme.

The fermented milks are usually well borne, especially by the stomachs of chronic alcoholics. By reason of the presence of alcohol and lactic acid they possess tonic and digestive properties; the carbonic acid lessens pain and vomiting.

Our author makes some interesting observations on the administration of milk in various diseased states. The quantity to be given daily ranges from 2 to 3 litres (67 to 101 fluidounces). Mautel has shown that 3 litres suffice to maintain the nutrition at the normal; below that amount the weight declines. As regards digestibility, it is found that 500 grammes (nearly 1 pint) pass out of the stomach in an hour. Reichmann's results (*Zeitschrift für klin. Med.*, 1885, vol. ix.) differ from those arrived at by Dujardin-Beaumetz, for the former asserts that 300 cubic centimetres require three hours to pass out of the stomach into the intestine. These two observers are also opposed as respects the relative digestibility of boiled and crude milk, Reichmann maintaining that boiled milk is the more digestible, and Dujardin-Beaumetz that there is really no difference. Pinard asserts that prolonged boiling favors the digestion of milk by peptonizing it in part.

As a diuretic milk is a valuable remedy in cardiac dropsy. As both an aliment and a diuretic it is much used in the treatment of catarrhal and interstitial nephritis. Easy of digestion, making little demand on the resources of the stomach, and promoting digestion by the formation of lactic acid, it is an important remedy in ulcer of the stomach, gastric catarrh, gastritis, etc. Having constipating properties, it is exceedingly useful in the treatment of diarrhœa and dysentery.

Dujardin-Beaumetz does not accept the view of Donkin that sugar of milk is not contraindicated in diabetes. Of other objections to its employment, he mentions dilatation of the stomach, in which it is objectionable by reason of its bulk, and in certain cases of acidity of the stomach, in which it is not well borne.

ANTIPYRIN.

DR. BLANCHARD (*Revue Méd. de la Suisse Romande; Revue de Thérap.*, July 1) has studied the effects of antipyrin under various conditions, and has reached the following conclusions:

In acute articular rheumatism, it affords relief as completely and more rapidly than does the salicylate of soda; but the dose necessary (four to six grammes—sixty to ninety grains) often produces erythema, but no other symptoms of intolerance. In the acute pneumonia of the adult, its effect has been slight, almost *nil*; in the infant, on the contrary, its good effects are often very manifest, and in general its administration is followed by prompt improvement. Dr. Blanchard has also frequently prescribed it in chronic bronchitis when an accession of high temperature has aggravated the existing condition, with the result that one to two grammes (fifteen to thirty grains) will bring the febrile movement to an end by the termination of the second day. In most of the anginose affections, except the suppurative and diphtheritic, the results of the administration have been the same: the fever soon ceases, and, although the disease proceeds on its usual course, the headache, the anorexia, and other unpleasant symptoms belonging to the fever, disappear. In ephemeral fever, influenza, gastric fever, and similar affections, a single dose of antipyrin (fifteen to thirty grains) suffices to dissipate all the *malaise*. In typhoid its action is purely antipyretic, and the results of its administration are much less satisfactory than the treatment by baths.

TREATMENT OF TYPHOID FEVER BY CORROSIVE SUBLIMATE.

In a recent issue of the *Berliner klinische Wochenschrift*, M. GREIFENBERGER proposes the use of corrosive sublimate in the treatment of typhoid fever, instead of massive doses of calomel. He employs this remedy instead of calomel, because of its antiseptic property, and with the view to avoid the too active purgation followed by hemorrhage, which is one of the risks of the latter. He gives the sublimate in solution, in the dose of two to three milligrammes (one-twentieth to one-thirty-second grain), the one-twentieth grain being the maximum. He also finds it useful sometimes to give a weak infusion of digitalis, or morphine may be added to the sublimate solution, according to the indications. The treatment should be continued until the temperature remains at the normal for several consecutive days, and the general state is improved. The evacuations are regulated by castor oil or compound infusion of senna. Greifenberger has never observed any ill results from the use of corrosive sublimate, such as vomiting, abdominal pains, salivation, etc. Of forty cases thus treated, none proved fatal. At the same time, in another series of thirty patients, treated by attempts to jugulate the disease, and by the expectant method, there were three deaths from complications. These results are to be compared with the mortality from typhoid in Berlin, which was 15.9 per hundred.

If these results be confirmed by further experience, the treatment by corrosive sublimate will be a distinct advance. The use of castor oil, especially of compound infusion of senna, will hardly be approved by practical physicians on this side of the ocean.

ANOTHER METHOD OF TREATING TYPHOID.

DR. ROBIN, in a paper recently read before the *Société Médicale des Hôpitaux*, of Paris, criticised the present antipyretic method of treating typhoid fever, and proposed a new one, which is applicable to all typhoid states. He holds that the chief danger is the accumulation of unoxidized materials in the organism, and he proposes, by the employment of medicaments which have the power to combine with this nitrogenous residuum, to render it soluble and cause its excretion. The medicines having this *solubilizing* property are especially salicylic and benzoic acids, which, combining with the nitrogenous radicals such as glycocoll, pass into the urine in the state of salicyluric and hippuric acids. In some preliminary investigations Robin ascertained that the administration of these remedies lessens the excretion of urinary solids and of urea, but this result does not mean that they lessen the activity of the combustion process; only that they combine in part with the combustible bodies.

Dr. Robin does not offer any statistical or clinical evidence of the value of the method proposed by him. Admitting the importance of the suggestion, it is not necessary to travel so far in search of an explanation of the utility of salicylic and benzoic acids. Both possess germicide properties and are antipyretic. May not any value they may have in typhoid fever be due to the destruction of the typhoid germ, and to the arrest of the metabolism set up by these bodies? When, however, remedies can be submitted to the *experimentum crucis* of comparative trials, is it not wiser to settle their relative claims in this way, than indulge in endless speculation regarding their *methodus medendi*?

 CONTRIBUTION TO THE STUDY OF THE FERRUGINOUS PREPARATIONS
EMPLOYED HYPODERMATICALLY.

DR. HIRCHSFELD has made the hypodermatic injection of iron preparations the subject of an elaborate essay, historical, physiological, and therapeutical (*Bull. Gén. de Thérap.*, July 15, 1886). In his historical summary, which is quite complete, he has not overlooked the contributions of Americans, and has referred to the paper of Da Costa. The first experience in this practice was that of Rosenthal, of Vienna, which was made in 1872. Since that time numerous observations and experiments have been reported, on the whole favorable to the practice. But Hirschfeld says: "Our results and conclusions do not coincide with those of the partisans of the hypodermatic method. We entered into the investigation without preconceived ideas, and we publish our conclusions as they were reached." The most important fact disclosed in the investigation thus far published, is the following:

"On examination of the blood, the number of red globules had sensibly diminished—a fact which had previously been observed both in men and in animals as a result of the hypodermatic injection of iron."

No conclusion has been reached as to the preparation most suitable for administration subcutaneously. The preparation of Rosenthal has been used more frequently, probably, than any other. This is obtained by dissolving the pyrophosphate in a solution of citrate of soda. In a half hour after the injection of this salt, iron may be detected in the urine.

THE USE OF COCAINE IN THE TREATMENT OF VENEREAL DISEASES.

BONO's experiences (*Gazette delle Cliniche; Revue de Thérapeutique*, July 1, 1886) in the use of cocaine in affections of the genito-urinary apparatus have some practical value, and we therefore lay before our readers a synopsis of them.

An injection of a two per cent. solution of cocaine arrests completely the soreness and painful erections of acute gonorrhœa. The injection should be retained in the urethra for about five minutes, and be repeated four or five times a day. This application of cocaine is also an unequalled means of preventing the suffering caused by caustic injections and the introduction of the catheter. The cutting pains attendant on gonorrhœa in the female invariably yield to the application of a two per cent. solution on a small tampon, or of a pomade five per cent. in strength.

The application of a cocaine solution facilitates the examination of the urethra or bladder by the bougie or endoscope, and prevents the pain of cauterizations, excisions of primary sores, and the destruction of condylomata by caustic or cautery.

CATARACT CAUSED BY NAPHTHALIN.

At a recent session of the Paris Academy of Medicine (*Revue de Thérap.*, July 15, 1886) MM. BOUCHARD and CHARRIN presented two dogs in which cataract had been induced by the internal administration of naphthalin. In five dogs cataract formed after some days' administration of this agent in the proportion of eighteen to twenty-four grains daily per kilogramme of the animal's weight. Although this quantity is about five times greater than that given to man, the fact indicates the necessity for caution in the use of such a substance. Moreover, the production of cataract in this way is eminently suggestive from the pathological point of view.

THE CONSUMPTION OF ALCOHOL IN FRANCE.

At a session of the French Academy, reported in the same issue of the *Revue de Thérapeutique*, quoted above, the subject of the consumption of spirituous liquor in France was discussed, *à propos* of a report made by a special commission instituted by a resolution of the Senate. The report demonstrates an extraordinary increase in the use of spirits by the French people. In forty years the consumption of spirits has doubled, and this increase coincides with a diminution in the production of wine. The alcoholization of wines appears to be carried on to a great extent, and in this direction, largely, the increased use of alcohol takes place. The commission declares that this strengthening of wines is highly injurious from the hygienic standpoint, and they recommend that the importation into France of fortified wines be forbidden.

This question is also an important one for the physicians of the United States who have occasion to prescribe French and other foreign wines. It is no doubt true that wines bear much better the ocean voyage if "fortified;" but if their alcoholic strength is thus increased, they have a different character from that possessed by them in their natural state. We learn an important lesson also, hygienically, in the experience of the French people, who have had in genuine wines of good quality, the most influential temperance promoter.

GELOSIN—A NEW EXCIPIENT AND VEHICLE.

In the issue of the *Bull. Gén. de Thérapeutique* for July 15, 1886, GUÉRIN, pharmacist, describes a new and apparently valuable product for various pharmaceutical uses. It is an amorphous, uncrystallizable, colorless, and non-nitrogenous substance, similar to *lichenin*, obtained from lichens, to *fucin* of the algæ, and to *pectose* of fruits, which causes their gelatinization. *Gelosin* is a mucilaginous principle which is extracted from some of the Japanese algæ. It dissolves in hot water in the proportion of 550 times its own volume, and on cooling forms a beautiful transparent jelly, which may be made to take any form, and its consistence can be varied to suit. It will take up all medicinal substances soluble in water alone, or made so by the addition of alcohol, glycerin, acids, or alkalies. Amongst the great number of applications to which it may be devoted, are the making of poultices, vaginal or urethral suppositories, cylinders or plates of variable thickness, impregnated with active medicinal substances, etc. It undergoes a continuous retraction, by which its medicinal contents are slowly expressed until the jelly is finally completely desiccated.

PILIGANINE

Is the title of a new alkaloid obtained from Peligan, a plant having some resemblance to lycopodium. A specimen of the plant was sent by Dr. Moncaro, of Brazil, to Dr. Dujardin-Beaumetz, and a chemical investigation was made by DR. BARDET, Chief of the Pharmacological Laboratory of the Cochin Hospital. (*Revue de Thérapeutique*, July 15, 1886.) An acrid resin and an alkaloid—piliganine—were isolated by Dr. Bardet. The alkaloid was found to be an active poison possessed of powerful emeto-cathartic properties. Further investigations are needed to determine the place of this new alkaloid as a therapeutical agent.

SALOL, A NEW ANTISEPTIC AND ANTIRHEUMATIC.

DR. SAHLI (*Centralblatt für die gesammte Therapie*, July, 1886) has produced a new phenol compound, in which an ether takes the part of a base. This substance is a salicyl acid phenol; it is a whitish powder, has a somewhat aromatic odor and but little taste, is not soluble in water but is soluble in alcohol. Its physiological action resembles that of salicylate of sodium. It is found in the urine, giving it a blackish hue like carbolic acid, and a peculiar odor. It is a decided antipyretic, and for this purpose the dose is from two to four grammes (thirty to sixty grains). In the various rheumatic affections it has acted efficiently. A case of chronic urticaria that had resisted other treatment yielded to salol. Dr. Sahli finds it indicated in diabetes, intestinal catarrh, typhus, cholera, etc., and in the treatment of wounds and injuries it may be substituted for iodoform.

MEDICINE.

UNDER THE CHARGE OF

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THE ETIOLOGY AND CURABILITY OF PERNICIOUS ANÆMIA.

It would be an error to say that only those are cases of pernicious anæmia which actually end in death. Moreover, the causes of certain forms of the disease have been discovered, and REYHER (*Deutsches Archiv für klinische Medicin*, Bd. 30, H. 1 and 2, 31-69) reports a series of really remarkable cases, in which the cause was clearly the presence of bothriocephalus latus. All of the patients had, at some time in their lives, evacuated portions of the parasite. Although some were in a desperate condition when treated with felix mas., yet almost immediately after the expulsion of the worm very marked improvement set in, which rapidly advanced to complete recovery. The symptoms more particularly examined were as follows: There was the most profound anæmia, with great and steadily increasing debility, unaffected by any tonic treatment, and which would almost certainly have terminated fatally, had not the cause been discovered and removed. No explanation for this condition could be found in the external surroundings; no structural or functional changes in any of the organs could be detected, except diarrhœa in certain patients; fever was present at times in many cases; there was no loss of adipose tissue; retinal hemorrhages occurred in several instances, and the symptoms of intense cerebral anæmia existed. All these are the characteristics of the progressive pernicious anæmia of Biermer, and the cases cannot but be considered as instances of this disease produced and favored by the presence of bothriocephalus latus.

As regards the condition of the blood, the author observed an absolute diminution in the number of corpuscles, and the presence of numerous small, highly refracting, granular bodies. The red blood-cells had ceased to lie in rouleaux; were often larger than normal, or of irregular form. He was unable to confirm any of the observations made by others, except that he saw in one case the small red bodies described by Eichhorst.

As to the etiological connection of pernicious anæmia with bothriocephalus latus, it has been proved that the "brickburners' anæmia," the "disease of the Gotthardt tunnel laborers," and some other affections, all similar to Biermer's "pernicious anæmia," are occasioned by the presence of ankylostomum duodenale or allied parasitic worms. It is certainly reasonable to suppose that bothriocephalus latus may in certain cases produce the same symptoms, as its favorite abode also is the small intestine.

How the injury is accomplished cannot yet be explained. It is possible that the bothriocephalus may sometimes fix its suction apparatus directly

upon a bloodvessel, as does the ankylostomum; or some infectious matter may be introduced through the worm into the circulation. The author believes that any alterations of the red blood-cells which may exist must be the effect of the disease; for, were they the cause, so immediate an improvement of the symptoms would not follow the expulsion of the parasite.

Reyher thinks it possible that the existence of helminths may have been the cause of many of the cases of pernicious anæmia reported by various writers, and that the presence of the parasite was either overlooked at the autopsy or no importance laid upon it.

ON THE OPERATIVE THERAPEUTICS OF BASEDOW'S DISEASE.

HACK reports (*Deutsche med. Wochenschrift*, June 24, 1886) the case of a patient who presented the usual symptoms of Basedow's disease, and, in addition, suffered from a permanent obstruction to respiration through the nose. Examination revealed extreme hyperplasia of the erectile tissue of the middle and lower turbinated bones. Operation on the right side was followed on the next day by an almost total disappearance of the exophthalmus of this side. A similar, though not so marked, diminution occurred in the left eye after the left side was operated upon.

On reëxamination several months later, it was found that an injection of the conjunctiva, which had at frequent intervals occurred, appeared much less often; the nervous palpitation had disappeared, the dilatation of the heart grown less, the goitre diminished in size, and an impaired sharpness of vision greatly improved.

Adopting the hypothesis that a neurosis of the sympathetic is the cause of Basedow's disease, Hack accounts for the recovery in this case on the ground that the seat of the disease lay in a permanent irritation of the peripheral filaments of the sympathetic in the nose. The symptoms, then, were vasodilator reflexes, by which the cardiac vessels and ganglia, the orbital expansile adipose tissue, and other parts affected, received too great a supply of blood. And operation upon the hyperplastic tissue was of benefit, just as it is in other reflex neuroses of the sympathetic, such as certain forms of asthma and of migraine.

DIABETIC HEMIPLEGIA.

R. LÉPINE and L. BLANC publish (*Revue de Médecine*, No. 2, 1886) an interesting case of diabetes mellitus, in the course of which right-sided hemiplegia developed. The patient, æt. thirty-nine, entered the clinic September, 15, 1881. He had been in good health until November, 1880, when suddenly symptoms of diabetes set in. The patient was then passing about 525 ounces of urine, and from 22 to 25 ounces of sugar daily. Under treatment the daily quantity of urine was reduced to 245 ounces.

Shortly after this amelioration the patient began to notice a feebleness in the right upper and lower extremities and right side of the trunk. This progressed so rapidly that in fifteen days there was complete right-sided hemiplegia. Simultaneously with the appearance of the hemiplegia, convulsions of the right side, including the right side of the face, set in. The convulsions recurred every four or five hours and lasted for five or six minutes. The

intelligence remained normal during the crises. Three weeks after the onset of the above symptoms embarrassment of speech was noticed. The convulsive seizures ceased ten days after admission into the hospital (Sept. 25), but the aphasia, which was complete, continued until the middle of October, at which time the patient could distinctly say "oui," "non." At the time of admission the intelligence was much lowered, the patient seemed demented. From this on improvement set in, and in the beginning of the year 1882 the state of the intelligence and hemiplegia had undergone a very marked improvement, but pulmonary phthisis now made itself manifest, and carried off the patient on the 22d of December, 1882. At the autopsy the brain showed no lesion perceptible by the naked eye. It was preserved in chromic acid (3 : 1000) for several months, and the liquid was renewed every eight days for the first few months. The brain was then examined with the microscope in sections. The left hemisphere showed an almost complete absence of the pyramidal cells, only a few triangular and small irregular cells could be seen. The neuroglia had undergone considerable change, its cellular elements were less numerous; it had lost its grained aspect, and appeared for the greater part made up of trabeculæ. The capillaries were found dilated. The right hemisphere was normal in every respect.

ON THE PATHOLOGY OF MULTIPLE NEURITIS AND ALCOHOL PARALYSIS.

OPPENHEIM (*Zeitschrift für klinische Medicin*, Bd. xi. H. ii. and iii. S. 232-262) gives several instances of multiple neuritis produced by alcoholism, although "taking cold" was the exciting cause in some cases.

The symptoms consisted in partial paralysis, usually confined to the lower extremities, with more or less degeneration of the muscles, perceptible rather to the hand than to the eye. There was also diminution of the electrical excitability with the reaction of degeneration. More or less pain, frequently with great tenderness on pressure; incomplete tactile anæsthesia, usually limited to the feet and legs; hyperæsthesia to heat and painful impressions, and paræsthesia were marked features. The gait was atactic-paretic, growing worse when the eyes were closed. The patellar reflex was abolished. This symptom frequently persisted long after the patients were in other respects well.

The cranial nerves were unaffected, except those supplying the muscles of the eye. Diplopia, paralysis of the accommodation, nystagmus, and immobility or sluggishness of the pupil were sometimes present. Implication of the optic nerve has been described by others, but was absent in Oppenheim's cases.

The disease resembles tabes dorsalis in some particulars, but the diagnosis is usually not difficult. In the cases under observation the pain was not so severe as in tabes; there was no girdle-pain, and never analgesia. There was always more or less paralysis, and usually disturbances of the electrical excitability.

The therapeutics of the disorder consist in the use of warm baths, and later of electricity. The avoidance of alcoholic drinks is essential and usually insures recovery, although this may be long delayed.

PERIPHERAL NEURITIS IN PHTHISIS.

MM. PITRÉ and VAILLARD contribute an extensive article (*Revue de Médecine*, No. 3, 1886) on the peripheral neuritis frequently met with in phthisis. The neuritis, they say, may exist while the brain and cord, and their membranes, show no evidence of disease. The disease of the nerves, therefore, cannot be secondary, but must be primary. Clinically they recognize three groups:

I. Latent peripheral neuritis, which runs its course without manifesting any disturbance. The clinical notes of two such cases are reported. Histological examination of several of the nerves showed a segmentation of the myelin into masses and partial atrophy of the sheath.

II. Amyotrophic peripheral neuritis. This form is characterized by a diffuse paralysis, which is rapidly followed by muscular atrophy. It has a very close resemblance to subacute anterior myelitis. But a post-mortem examination reveals a healthy cord and membranes, and parenchymatous neuritis. Six cases belonging to this group are collected from recent medical literature, and a *résumé* given of each. They all presented features closely resembling subacute anterior myelitis, but were distinguished from it by one important phenomenon. This was the existence of some form of sensory disturbance, such as neuralgic pains, anæsthesia, hyperæsthesia, loss of muscular sense, etc., concurrently with the paralysis or preceding it for a shorter or longer period.

III. Peripheral neuritis with disturbances of sensibility predominating. Few consumptives escape without having sensory disturbances at some time during their illness. These have various causes, some of which are gross lesions of the cord, meninges, or of the nerves themselves. Virchow has observed a case in which a solitary tubercle occupying the lateral column of the cervical cord caused a brachial neuralgia of the corresponding side. But in the cases falling under this group there is no other lesion of the nervous system than a parenchymatous inflammation of the peripheral nerves. Four such cases are narrated in full. The authors make the following conclusions:

1. In the course of tuberculosis, as in other infectious diseases, it is not rare to find the peripheral nerves the seat of parenchymatous changes presenting the characters of degenerative neuritis. 2. These changes develop primarily, and do not depend upon a preëxisting lesion of the brain or cord. 3. The pathological changes may involve indifferently the sensory, motor, or mixed nerves. They may equally attack the cranial nerves (optic, oculomotor nerves), pneumogastric, phrenic, etc. 4. The symptoms of these affections are very variable, and are still imperfectly known. On comparing them, however, the three clinical divisions above described will be readily distinguished. 5. The frequency of peripheral neuritis in consumptives, the variability of its distribution and symptomatology, explain the polymorphism of the nervous troubles observed in phthisis.

AN UNUSUAL FORM OF PROGRESSIVE MUSCULAR ATROPHY.

CHARCOT and MARIE (*Revue de Médecine*, No. 2, 1886), in an elaborate article, accompanied by several photographs, treat of an unusual form of progressive muscular atrophy.

The disease begins in the most distal parts of the inferior extremities, and gradually extends up the legs. The muscles of the thigh remain intact for a long time. Paralysis sets in at about the same time as does the atrophy, and keeps pace with it. The muscles of the upper extremities never become affected until a long interval elapses after the disease has attacked the inferior extremities. The intrinsic muscles of the hand are the first of the muscles of the superior extremity which become involved. From these the atrophy and paralysis pass gradually to the muscles of the forearm and arm; all the other muscles of the body remain absolutely intact. Though the affection may be said to progress symmetrically, the disease is usually more pronounced on one side. Fibrillar contractions are observed in most of the affected muscles. The excitability of the muscles by percussion is not increased; on the contrary, it is diminished, and disappears long before the loss of function and atrophy become complete. The tendon reflexes comport themselves much in the same way. An electrical examination could be carried out in only three of the subjects. In the most advanced state of the affection the muscles showed absolute inexcitability to both currents. In the muscles considerably altered "the reaction of degeneration" obtained; and, lastly, in the muscles slightly affected there was only a slight diminution of the electrical excitability. Vasomotor disturbances were manifest in a bluish or reddish discoloration of the skin of the affected members. The temperature was lowered; in four of the cases the sensibility was absolutely intact. In the fifth case there was anæsthesia to pricking and temperature, most marked in the soles of the feet. Another noteworthy feature in this case was the presence of pain, which, however, continued for only the first two years after the onset of the disease. The general condition may be said to offer nothing special of note; the patients enjoy good health. It may be of interest to mention the fact that the patients are constantly changing their position, so as to retain their equilibrium. The disease begins generally in infancy or in adolescence. In Charcot and Marie's five cases, three were three years, one was fourteen years, and one was fifteen years of age. Of nineteen cases observed by other authors, fourteen showed the affection before the age of twenty-two. The disorder seems to have a predilection for the periods between three and four years and fifteen and sixteen years. It may, however, occur later in life. Eichhorst had a case aged thirty-six years, and Wetherbee one aged thirty-nine. Heredity plays a very important rôle in the causation; but three of the authors' cases showed no hereditary taint whatever. Taking all the features into consideration, the authors think that these classes of cases belong to the myelopathies rather than to the myopathies. The clinical reports of similar cases to the authors, nineteen in number, and observed by Eulenburg, Eichhorst, Wetherbee, and Ormerod, are given at the conclusion of the paper.

STREPTOCOCCUS IN PNEUMONIA AFTER TYPHOID FEVER.

H. NEUMANN (*Berliner klinische Wochenschrift*, Nos. 26 and 27, 1886) reports a case of typhoid fever with noma and lobar pneumonia, followed by death. No typhoid bacilli could be found in the organs, probably because the disease was too far advanced. Very numerous cocci were, however, discovered in the pneumonic lung, which, upon cultivation, proved to be strep-

tococci. After making a large number of culture experiments and inoculations with the purpose of determining whether this species of streptococcus is identical with any of those described by Fränkel, Löffler, Krause, and others, Neumann comes to the conclusion that there exist no satisfactory and invariable points of difference between the various so-called species, either as regards their method of growth upon culture media, or in the symptoms they produce when inoculated upon animals. Even such supposedly distinct forms as the streptococcus of erysipelas, on the one side, and that of pus on the other, do not differ materially from the one found by him in the lung. The author believes that the various streptococci are really identical, but that they may in different cases possess different degrees of virulence when obtained from the organism, and that they may alter this degree upon cultivation.

In the case reported, it is most probable that the coccus was introduced directly into the lung by means of respiration—the ulcerative process in the mouth being the starting-point—and that a pneumonia was in this way produced in a subject already debilitated.

DISEASES OF THE HEART RESULTING FROM OVER-EXERTION.

LEYDEN publishes an exhaustive article under this title in the *Zeitschrift für klinische Medicin*, Bd. xi. H. 2 and 3, 105–166. It has been recognized by many writers that diseases of the heart may be produced by muscular strain, as also by mental excitement or great emotion. The author quotes extensively from the literature of the subject, and speaks particularly of the “overstrain of the heart,” as described by J. Seitz. Some distinguished authorities, however, claim that such a thing as the tiring or exhaustion of a heart, the muscular substance of which is perfectly healthy, cannot exist. Leyden has been convinced from an extensive experience, not only of its existence, but that it is very frequently a cause of many threatening cardiac symptoms.

Too often, as a result of our modern methods of physical examination, the pathological condition is called the disease, while no attention is paid to the manner in which it was produced. Thus, “dilatation of the heart” is denominated the primary affection, whereas it is but the effect. Following the rational method of studying them, Leyden forms three groups of diseases of the heart due to over-exertion of the body:

1. Sclerosis of the aorta, aneurism of the aorta, arterio-sclerosis.
2. Insufficiency and rupture of the aortic valves.
3. The true “cardiac overstrain” of Seitz, in which the valves remain quite intact, and the muscle substance is but little or not at all affected.

As regards the first two classes, Leyden says it is probable that severe labor is often a cause of arterio-sclerosis. It is certain that it frequently produces aneurism. And that insufficiency of the aortic valves is often suddenly effected by violent muscular exertion is proved by numerous cases in medical literature, from which he quotes several very interesting instances. But he devotes attention particularly to the third class, and reports a series of instructive cases, from which he draws the following conclusions:

The symptoms of “cardiac overstrain” develop either suddenly or more gradually in individuals who have put forth violent exertion throughout a longer or short time, or in those who have employed perhaps only moderate

bodily exercise, while convalescing from some slight disease (Da Costa). We can recognize two stages:

First stage: Cardiac erethism. The symptoms are at first scarcely noticeable. The patient becomes easily tired, suffers some shortness of breath on exertion, and perhaps some pain about the heart, with palpitation. Of objective symptoms, the first to be observed is:

(a) *A change in the character of the pulse*, which becomes more rapid, especially after exercise, and at the same time irregular. This combination (*delirium cordis*) is present either constantly or at times in nearly all cases.

(b) *An increased heart's impulse* is another symptom, sometimes associated with the "gallop rhythm" described by Fränkel. The origin and indication of this peculiar phenomenon are not fully understood. It certainly occurs only in weak conditions of the heart.

(c) When the affection is advancing, *tremor cordis* develops itself. This symptom, recognizable to the hand as a peculiar trembling, undulating impulse, is caused by a succession of very rapid incomplete contractions.

Second stage: Cardiac dilatation. The symptoms of this stage are:

(a) *Dilatation of the Heart.* This, when present, can be usually although not always detected. The position of the apex beat, when perceptible, is the best criterion for the existence of dilatation of the left ventricle.

(b) *Auscultatory Symptoms.* The heart tones are usually clear, and either strong or weak. Sometimes the "gallop rhythm" is to be heard. Occasionally a systolic murmur is audible at the apex, due probably to a relative insufficiency of the mitral valve.

(c) *Functional Disturbances connected with Weakness of the Heart.* These include the symptoms of the first stage intensified. They are: Increased dyspnoea amounting even to orthopnoea; a great sense of pressure; attacks of pain in the cardiac region resembling often angina pectoris; total incapability for bodily or mental labor; cerebral symptoms, as vertigo and fainting (these may also occur in the first stage); disturbances of digestion which constitute symptoms of grave prognostic import, and disturbances of circulation similar to those seen in valvular affections, and prominent among these œdema.

A *third or terminal stage* of the disease exists, characterized by extreme weakness of the heart muscle. Asystolia or cardiac insufficiency is developed, with its attending symptoms; as cyanosis, suppression of urine, collapse, etc., and finally coma, ending in death. This stage seldom lasts long. It may, indeed, be so short that we speak of "sudden death."

As to prognosis and termination, the disease is always a serious affection, yet it can usually be arrested during the first stage, and complete or partial recovery takes place. Sometimes, however, symptoms of the greatest danger to life arise before any perceptible dilatation is reached.

In the second stage the tendency of the disease is toward a fatal termination; either rapidly or after lasting for years. Temporary improvement may repeatedly take place, and the dilatation even be reduced in amount. Sometimes the disease appears to begin with the second stage. In other cases an individual after violent exertion suffers at once from the symptoms of the terminal stage of heart overstrain, and dies after a short time.

The autopsy of all of Leyden's fatal cases revealed dilatation of the heart, especially of the left ventricle, together with a globular widening of the apex.

The other organs showed the ordinary results of passive congestion. The heart muscle was sometimes thinner than normal, especially at the apex, and frequently exhibited tendinous patches. It was often microscopically quite intact, but not infrequently had undergone slight fatty or fibrinous degeneration in the layer just beneath the endothelium. Since this was never of a degree sufficient to account for the presence of dilatation by assuming that there had occurred earlier some myocarditis, Leyden believes the dilatation is due to a simple stretching of the previously healthy muscle, caused by the greatly increased arterial pressure following violent muscular action.

This over-exertion of the body may be the only acting cause, or it may be combined with others. Such, for example, are other diseases of the heart already existing, especially affections of the aortic valves. Leyden reports an interesting example of its combination with stenosis of the aortic orifice. Arterio-sclerosis, particularly as represented by contracted kidney, may also coöperate with bodily over-exertion to produce a dilated heart.

A series of other etiological influences, which of themselves are sufficient to produce cardiac weakness or cardiac erethism, will even more certainly secure results injurious to the heart, when combined with overstrain of the body. They are the abuse of alcoholic drinks; "fat-heart" (*i. e.*, the weak heart produced by corpulency); the previous occurrence of acute diseases; anæmia and chlorosis; advancing years, and finally mental agitation and excitement of the passions. These latter might be called "psychical overstrain," since they produce the two most prominent symptoms following corporeal strain, namely arrhythmia and dilatation of the heart. We may also distinguish the two stages, that of cardiac erethism, and that of cardiac dilatation. Leyden has observed instances of serious injury to the heart arising from a combination of psychical and corporeal overstrain.

An unusual group of cases, instances of which the author relates, differ considerably from those already described. Over-exertion of mind or body is the cause, but the symptoms consist in attacks of fainting, general weakness, and a *very marked retardation of the pulse rate* to forty, thirty, or fewer beats per minute. This latter symptom is the most prominent one, and frequently persists after the others have disappeared.

The treatment must be directed against the cause. All over-exertion is to be avoided; and even absolute rest in bed is often necessary. The diet must be nourishing and stimulating, and it is of the highest importance that dyspepsia, if present, be removed. Of drugs, by far the most useful is digitalis. Its beneficial action is to be judged by its diminishing dyspnoea, producing diuresis, and strengthening the systole; not by its retarding the rapid pulse-rate. This is not always to be sought after, and its occurrence is an indication that the desired action of the drug upon the heart has been overstepped. Its employment is contraindicated in excessive cardiac weakness, and in very rapid or very slow pulse-rate. When administered, use rather large doses for one to three weeks, and then stop for a time, as it loses its effect. Helleborine, caffeine, strophanthine, and convallaria are similar to digitalis in their effect, but inferior to it.

Narcotics often cannot be dispensed with, in order to give rest for some hours to patients suffering great pain or oppression, but they must be used with care. Tonics are sometimes beneficial—extract of coca among others.

Cheerfulness is to be cultivated. Change of scene and air (but not to salt air) are useful.

Various "cures" have been recommended for chronic diseases of the heart. The milk cure, used by Russian physicians, is not favored by Leyden. Salt baths or iron baths, as recommended by Scholz, and others, may be beneficial. Massage and gymnastics of a suitable kind have been much praised, and would perhaps be of use if employed in proper cases. He is opposed to the "heart gymnastics" of Oertel, on the ground that they are either inefficient or injurious.

As a supplement to his paper, Leyden publishes a personal communication from Dieckerhoff, professor at the veterinary school in Berlin, regarding the diseases of the heart occurring in horses after over-exertion. There may be produced an enlargement *in toto*, hypertrophy with dilatation, and various lesions of the valves. They are most frequently observed in horses used for rapid travelling, since the greatest and most prolonged strain is experienced by them.

CONTRIBUTIONS TO THE DIAGNOSIS AND THERAPEUTICS OF DISEASES OF THE STOMACH.

RIEGEL (*Zeitschrift für klinische Medizin*, Bd. xi., H. 2 and 3, 167-216) publishes the results of his experience during the year 1885, but devotes his long and exhaustive article solely to the bearing of the chemical examination of the secretion of the stomach upon the diagnosis and therapeutics of its diseases. This chemical examination he considers, in most cases, indispensable, and it is often the sole means of forming a correct diagnosis, particularly in carcinoma.

His method of procedure is as follows: He administers a "test meal" at dinner-time, consisting of a mixed diet, the same for every case, and in six or seven hours he removes this *undiluted* by means of a stomach-tube. Digestion should be complete within seven hours and the stomach empty, therefore any portions of undigested food thus removed prove that the process has been unnaturally delayed. He next filters the mass thus obtained, and tests the filtrate with reference to the following conditions: (1) The reaction as exhibited with litmus. (2) The presence of free hydrochloric acid and (3) of organic acids. The tests preferred are tropæolin oo 3, methyl-violet, and the carbolized chloride of iron test of Uffelmann. (4) The digestive strength ascertained by the artificial digestion of a portion of albumen of a definite size. (5) The amount of free hydrochloric acid present, estimated quantitatively. Sometimes he tests also for peptone and parapeptone. Simply the macroscopic examination of the material left upon the filter will, in some cases, render an almost certain diagnosis possible. Vomited matter cannot be used for purposes of diagnosis, for the act of vomiting generally occurs soon after a meal, and free hydrochloric acid does not normally appear until about three hours after eating. The admixture of mucus from the mouth and nose, or of regurgitated bile interferes, too, with the chemical tests.

Riegel's conclusions, based upon 1379 chemical examinations in 122 cases, are that in diseases of the stomach we may find four conditions of the secretion: (1) It is completely normal. (2) Free hydrochloric acid is diminished in amount or absent (*i. e.*, cannot be detected by the tests mentioned), organic

acids are usually abundant; peptic strength is wanting. (3) Hydrochloric acid is present, together with a large quantity of the organic acids. (4) There is a hypersecretion of hydrochloric acid. In general, whenever free hydrochloric acid is to be found there is no diminution of the digestive strength.

Considering now the bearing of these various conditions of the secretion upon the different diseases of the stomach, the author finds that in *carcinoma ventriculi* free hydrochloric acid is almost *constantly* absent and digestive power is entirely wanting. This is the strongest of all diagnostic signs, and without it a diagnosis of carcinoma cannot safely be made, even though other characteristic symptoms be present. During seven years he has seen no case in which the acid was generally or even frequently present. The cause for this absence of the acid is not yet fully explained. Riegel believes it to be due to some alteration produced in the gastric juices by the carcinoma.

In certain cases of *continuous discharge of bile into the stomach* he found no free acid or peptic strength. This is caused by the chemical action of the bile upon the gastric juice.

In *ulcus ventriculi* the removal of the contents of the stomach cannot be safely practised while the ulcer is still unhealed. In convalescents the peptic strength was normal; organic acids were usually absent, and the amount of free hydrochloric acid rather increased than otherwise.

In *gastrectasia* (not due to carcinoma) free hydrochloric acid was very rarely absent, and the digestive strength was not diminished. Certain cases showed the acid to be much increased in quantity, and at all times present in the stomach, thus interfering with the digestion of starchy food. Organic acids were often abundant.

In *chronic dyspepsia* the amount of free hydrochloric acid was sometimes diminished but oftener increased, and the peptic strength was usually normal. Lactic acid was generally present, and at a time when it should normally have disappeared.

Nervous dyspepsia is characterized by severe dyspeptic symptoms during digestion, yet without alteration of the secretion in any respect. It is a neurosis of secretion. Riegel treats of the therapeutics of gastric disorders only as indicated by the chemical examination.

Dilatation (apart from that caused by pyloric stenosis) is produced by retarded digestion, causing food to be continually present in the stomach. This retardation is effected: (1) by a diminution of the secretion; (2) by abnormal fermentation; (3) by hypersecretion; (4) by diminished muscular power. In all these conditions the washing out of the stomach must be practised daily, in order to remove all undigested food before fresh nutriment is given. But this should always be combined with other methods of treatment, as indicated by the chemical examination—such as the use of antacids, the avoidance of starchy foods in cases of hypersecretion, and the employment of massage and electricity when there is lack of motor tone. He prefers to wash out the stomach in the evening, and then to give a very light and easily digestible meal. The organ thus obtains a period of rest during the night.

In all cases of diminished secretion he advises the administration of hydrochloric acid in divided doses, beginning an hour after meals. Thus the presence of too great an amount of acid is avoided, and the digestion of starch not interfered with. Yet in carcinoma he has never found that hydrochloric acid,

when given alone, appeared in the gastric juice, or increased its ability to digest. He believes that large doses of the acid combined with pepsin might have a better effect. Peptones, too, are well borne by the stomach, and patients often improve for a time on them.

ON THE TREATMENT OF GASTRIC ULCER WITH THE ALBUMINATE OF IRON.

Realizing that it is often necessary to remove the ultimate cause—the anæmia or chlorosis—before the healing of a gastric ulcer can be accomplished; and having had five years of most satisfactory experience with the albuminate of iron in other affections, GEMPT (*Berliner klinische Wochenschrift*, No. 15, 1886) was led to employ it in cases of gastric ulcer in which the ulcer was still unhealed.

The use of iron in this stage has been universally condemned on account of its irritant effect. But the liquor ferri albuminate made by Drees, of Benthaim, is of absolutely neutral reaction, free from any metallic or astringent taste, does not coagulate albumen, and is perfectly well borne by the stomach. Gempt administers two to four grammes of the solution, alone or diluted with milk, three times a day and shortly before meals, as it appears to increase the appetite. The recent occurrence of hæmatemesis is no contraindication to its use. His results have been surprisingly good. After the exhibition of the remedy was commenced, he has never seen hemorrhage recur, although he has used it in numerous cases. Nor has he ever seen its administration produce pain, or increase it if already existing. It seems to be absolutely unirritating to the walls of the stomach or the surface of the ulcer.

With the use of the albuminate he combines a careful diet of milk or beef peptones, the employment of small doses of Carlsbad salts, as recommended by v. Ziemssen, and of small doses of morphia when absolutely necessary. It is very important to procure a reliable preparation of the iron albuminate, since some are not totally free from acid.

ON THE DIAGNOSIS AND THERAPY OF PERFORATIVE PERITONITIS.

E. WAGNER (*Deutsches Archiv für klinische Medicin*, B. 39, H. i. and ii. S. 70) reports an unusual instance of perforation of the intestine with peritonitis; and after discussing the various means of diagnosis proposed, draws the following conclusions:

The only infallible method of differentiating between intestinal meteorism and peritoneal meteorism, occurring respectively in acute peritonitis and in peritonitis from perforation, lies in the fact that in the former the coils of intestine are visible, or their movements may be felt, or, at any rate, heard on auscultation; while in the latter no movements can be detected by any of these methods. The auscultation must be continued at least two minutes.

This condition is produced by the presence of gas in the peritoneal cavity, which displaces the intestines backward and compresses them.

The only proper method of treatment consists in abdominal section for the removal of the contained fluid and gas.

CHYLURIA WITH CHYLOUS ASCITES.

PROFESSOR SENATOR records an interesting case of this not very common affection. The patient, æt. forty-six, a Prussian, had lived for a long time in North America, and resided most of the time on a marshy peninsula in Massachusetts. Of his antecedent disorders, it is stated that he had had a double sciatica, lumbago, and an illness that set in with fever and headache, in the course of which icterus developed, attended with a dark brown urine. It was not until considerably later that the milky urine made its appearance. On examination, Senator found an enlargement of the liver and spleen, without any further change. At the apex was heard a low murmur, with the first sound. The urine had the appearance of a yellowish emulsion; had a sp. gr. of 1.020, without any remarkable smell, with an acid reaction; there was a copious sediment of urates. The scum on the surface microscopically showed nothing more than fat globules. The supernatant fluid on being removed from the sediment, and shaken up with ether, cleared up considerably, but not entirely. This it did, however, on the addition of liquor potassæ. The urine contained, in addition to the fat globules, serum albumen, globulin, or fibrinogen and propepton. The chylous feature of the urine was most marked in that passed during the night or toward the morning; that excreted during the day was free from chyle. The chyluria continued for three weeks, then disappeared. Ascites developed, and the effusion of fluid was so great that tapping had to be performed. Nine litres of a greenish milky fluid were withdrawn, possessing a neutral reaction, and a sp. gr. of 1.015. The fluid cleared up on the addition of ether. Microscopic examination revealed extremely fine fat granules and a few lymphoid cells. The patient became extremely emaciated, and, after a time, succumbed.

An autopsy was refused. The diagnosis of hepatic cirrhosis, with chronic peritonitis, was made. Two different conditions may give rise to a milky appearance of ascitic fluid: (1) finely divided fat, mixed with real chyle (hydrops chylosus); (2) finely divided fat, mixed with fat globules (hydrops adiposus). The first may have for its causes: (1) injury of the chyle vessels, or rupture from over-disturbance, due to coarse mechanical obstruction; (2) the presence of parasites (*filaria sanguinis*) in the blood, causing stagnation and perforation of the chyle vessels.

Hydrops adiposus may be produced (1) by a fatty degeneration of the ascitic effusion, such as has been observed in carcinoma and tubercle of the peritoneum, and occasionally in simple degeneration of the peritoneal endothelium, without any other abnormality; (2) by an abnormal amount of fat in the blood—lipæmia. The remarks made about chylous ascites apply to chyluria. The differential points of the two forms, chyluria and adiposuria, are recognized with the microscope. In chyluria, excepting lymph cells, pus cells, and a few red blood-corpuscles, there will not be found any tissue elements, especially no tube casts or epithelium. In adiposuria, on the other hand, the urine will contain fat cells, various cylinders, and red blood-corpuscles. In that form of lipuria, however, due to lipæmia, all morphological elements will be wanting. It would seem as if the fat cells simply transude through the walls of the vessels without giving rise to any irritation.

IMPROVEMENT IN THE USE OF FEHLING'S SOLUTION.

As is well known, in performing the titration for sugar in urine with Fehling's solution, it is frequently difficult to determine exactly the moment of completed reaction. Generally, when this point has been reached, the precipitate falls at once as a more or less flocculent mass, leaving, in a few moments, a clear supernatant fluid the color of which there is no difficulty to determine. But it often happens, especially when the percentage of sugar is small, that in spite of precipitation there remains a permanent greenish-yellow turbidity, due to fine particles of cuprous oxide in suspension, and of a degree sufficient to hide completely the delicate shades of blue which the fluid assumes as the reaction nears completion. It is impossible to remove this turbidity by filtration, for the particles of suboxide are so fine that they will pass through any filter-paper. Nor is this turbidity the only difficulty, for the urine contains normally substances which not only reduce the cupric salt to a cuprous, but also redissolve the cuprous oxide when formed; among these are creatinin, uric acid, ammonia evolved from the nitrogenous substances by the NaHO of the Fehling's solution, and glycuronic acid compounds. Hence, when a considerable amount of sugar is present, it is customary to dilute the urine so as to minimize the reducing and dissolving influences as far as possible.

In order to obviate the difficulty which this persistent turbidity presents, I. MUNK (*Virchow's Archiv*, 1886, vol. cv. p. 63), after experimenting in various directions, found that the addition of three to five drops of a fifteen per cent. solution of CaCl_2 , when 10 c. c. of Fehling's solution had been used, was sufficient to carry down with it everything remaining in suspension, and to leave a fluid above, not only perfectly clear, but also containing no trace of copper in solution. When the calcium chloride is added there is formed, in addition to calcium hydroxide, calcium tartrate. The tartrate, though soluble when cold, forms a gelatinous precipitate at the boiling temperature, and it is this which carries all before it as it settles. Another, though minor advantage, is that it prevents the precipitation of earthy phosphates and carbonates which occurs when urine is added to the alkaline copper solution, it having the power of holding these precipitates in solution.

Munk finds this method to answer perfectly well for urines in which the proportion of sugar is even less than one per cent., and the amount of creatinin, etc., large, though a larger amount—fifteen drops—of the CaCl_2 solution will then be necessary. The solution should be added after the first precipitation by the sugar has taken place. As from the character of the precipitate ebullition is liable to be accompanied by sudden and violent liberations of steam, it is advisable to use a small flame and a fine-meshed gauze beneath the flask.

QUANTITATIVE DETERMINATION OF THE REDUCING SUBSTANCES IN NORMAL URINE.

Certain constituents of normal urine, known collectively as "reducing substances," have the power of reducing cupric to cuprous oxide, while at the same time they hold the latter in complete or partial solution when once formed. Hence the turbid amber or yellowish or greenish-red color

often assumed by urine on boiling with alkaline copper solutions. This power of the reducing substances forms, necessarily, a small but nevertheless appreciable element of error in the quantitative determination of glucose by Fehling's method. FLÜCKIGER (*Zeitschr. f. Phys. Chem.*, vol. ix.), SALKOWSKI, (*Centralbl. f. d. med. Wissensch.*, 1886, No. 10), and I. MUNK (*Virchow's Archiv*, 1886, vol. cv.), have sought to determine the amount of these substances.

Flückiger adds, after the copper salt has been reduced, a $\frac{1}{2}$ per cent. solution of glucose from a burette, till all the cuprous oxide in solution or suspension has been precipitated. From the amount necessary to produce complete precipitation the reducing power of the volume of urine used is calculated. He determined it to be equal to a solution containing 0.15 to 0.25 per cent. of glucose.

Salkowski's method is as follows: 5 c. c. of urine, 5 c. c. of sodium hydrate solution (sp. gr. 1.34), and 3 to 6 c. c. of a ten per cent. cupric sulphate solution are boiled together for five minutes. The mixture is then feebly acidified with hydrochloric acid, and the cuprous oxide which has been formed precipitated by potassium sulphocyanide; the precipitate is then dried and weighed. From this it was determined that the average reducing power of the urine was equal to that of a 0.4 per cent. glucose solution.

In repeating Flückiger's experiments, Munk met with the same difficulty mentioned in the preceding notice, namely, that the cuprous oxide remained in a state of fine suspension in many cases, even after the addition of what was afterward proved to be quite an excess of glucose. To overcome this difficulty he had recourse to the CaCl_2 solution described above, with excellent results, the entire precipitate being carried down, leaving a clear fluid above. In nine specimens of normal urine examined, he found the amount of reducing substances, calculated as glucose, to vary between 0.16 and 0.47 per cent., an average of 0.3 per cent.

ALBUMINOMETRY BY ESBACH'S METHOD.

ESBACH, of Paris, had tubes so graduated that when albumen was precipitated in them by a picric acid solution, and allowed to stand twenty-four hours, each degree covered by the sediment corresponded to so many grammes of albumen per litre of urine. His picric acid solution is made as follows: Picric acid 10 grammes, citric acid 20 grammes, water 1000 grammes. George Johnson, of London (*Lancet*, July 10, 1886), has recently tested the accuracy of this method with, as he states, gratifying results. He finds that a solution of picric acid, five grains to the ounce, gives results identical with those obtained by Esbach's solution, while it does not, like the latter, precipitate the urates and uric acid, which, when abundant, may prove a source of no inconsiderable error by increasing the bulk of the precipitate. VEALE, of London, and GUTTMANN, of Berlin, also testify to the accuracy of this method. The tubes may be had of Brewer Frères, 43 Rue St. André des Arts, Paris, and of E. Cetti, 36 Brooke Street, Holborn, London.

OXYBUTYRIC ACID IN DIABETIC URINE.

STADELMAN (*Zeitschr. f. Biol.*, xxi. p. 140) agrees with Külz and Minkowski in affirming that the acid found in the urine, in many cases of diabetes, is

oxybutyric acid. In accordance with his view that diabetic coma results from the presence of an acid in the blood, he proposes to treat these cases with intravenous injections of a three to five per cent. solution of sodium carbonate. He injected considerable quantities of a seven per cent. solution into the veins of a dog with no untoward results.

CONDITIONS AFFECTING THE PRESENCE OF THE VOLATILE FATTY ACIDS IN THE URINE.

In normal urine VON JAKSCH (*Tagebl. d. 58 Vers. deutsch. Naturf. u. Aerzte*, Strassburg, 1885) found volatile fatty acids to exist preformed, in amounts varying from mere traces to 0.008 gramme a day. The variation in quantity is very considerable, and depends on the character of the food taken. Alcohol increases it. In the febrile condition relatively large quantities are found (from 0.06 to 0.1 gramme in twenty-four hours), the amount being proportional to the height of the fever. In pneumonia and phthisis the increase appears to depend chiefly on acetic and butyric acids, but in typhoid fever on acetic acid alone. In all organic hepatic disease (cirrhosis, abscess, chronic hepatitis, carcinoma, and syphilitic liver) the quantity often amounted to over 0.1 gramme a day. In a case of diabetes with acetonuria, no fatty acids were found. The term "lipaciduria" has been applied to this condition.

A NEW HÆMOMETER.

VON FLEISCHL (*Oesterr. med. Jahrb.*, 1885 and 1886) has constructed a new form of apparatus for measuring the quantity of coloring matter present in the blood, intended for rapid and accurate clinical use. He very correctly calls attention to the fact that the practice now in vogue of counting the corpuscles is of comparatively little value, since it is not their number but their richness in hæmoglobin which is of the more importance. The determination is made by comparing the color of a definitely diluted specimen of blood with that of an illuminated wedge of ruby colored glass, upon which are graduations showing the correspondence between the different tints of the glass, as conditioned by its thickness, and solutions of hæmoglobin of certain strengths. The apparatus is manufactured by Reichert, Bennogasse 26, Vienna.

SURGERY.

IN EUROPE.

UNDER THE CHARGE OF

FREDERICK TREVES, F.R.C.S.,

SURGEON TO, AND LECTURER ON ANATOMY AT, THE LONDON HOSPITAL.

RECENT SURGICAL LITERATURE.

Since the appearance of the last summary, two new volumes of the *Dictionnaire Encyclopédique des Sciences Médicales* have been issued. The first runs from "Tep" to "Tet." The most important article comes under the

head of "Testicule," and to the discussion of the anatomy and affections of this organ over 150 pages are devoted. The anatomical sections are written by Wertheimer, Tourneux, and Hermann; the pathological sections by Mollière, Augagneur, and Reclus. The monograph maintains the high standard that has made this dictionary famous. Of special value and importance is the able paper on syphilitic affections of the testis by M. Reclus. The next article of surgical interest is "Tetanos," by Dr. Mathieu. It is an elaborate and valuable paper; a little verbose in its pathological sections, but exhaustive and up to date. In conjunction with it may be noted Dr. Raymond's shorter article on "Tetany."

The second volume covers the ground from "Ele" to "Embr." The principal surgical paper is that by Dr. Brassac, on "Elephantiasis." It provides an excellent summary of the chief features of this somewhat ambiguous affection, or series of affections, but in completeness and originality does not compare favorably with Esmarch and Kulenkampff's monograph recently noticed in this summary. The other article of surgical import is "Embolie," by Dr. Raymond.

DR. LORENZ'S monograph, entitled *Pathologie und Therapie der seitlichen Ruckgratverkrümmungen* (Vienna, 1886), will be received with pleasure by all orthopædic surgeons. It deals, as the title implies, with the whole subject of lateral curvature of the spine (scoliosis). Although the literature of this deformity is very extensive, and in fact too extensive, the present volume will be most welcome. So many theories have been advanced as to the causes of scoliosis, so many accounts have been published of its anatomy, and so many measures have been devised for its relief, that this all-comprehensive and well-digested book will be accepted with relief. It is admirably written, is founded upon careful original research, and is illustrated by an excellent series of cases. The sections on the anatomy of the affection are peculiarly interesting, and next in value may be placed the sections on treatment. The questions relating to diagnosis and prognosis are also well discussed. The book is illustrated by excellent plates of the bones concerned and by a series of photographs from patients.

DR. PAUL BRUNS has issued (June, 1886) a new fasciculus of his *Beiträge zur klinischen Chirurgie*. It is mainly occupied with a long statistical examination of the cases of harelip occurring in the clinic between the years 1843 and 1885. The paper will have an historical value, and seems well to demonstrate the progress of treatment. The other principal papers are on actinomycosis in man, and on the treatment of cold abscesses. The treatment mainly concerned is that by iodoform injections.

Les Bactéries et leur Rôle dans l'Anat. et l'Hist. path. des Maladies infectieuses, by CORNIL and BABES (Paris, 1886), is the second edition of a well-known work. It has grown greatly in bulk, and its alarming dimensions are a visible criticism upon the progress of bacteriology. It may be safely said that the present volume forms the most complete and valuable treatise upon bacteria that we possess. The subject should be well discussed in 838 pages. The first part deals with a description of all forms of microorganisms, their classi-

fication, varieties, and modes of growth. It contains an excellent chapter on "Ptomaines," and another of practical value upon the question of the "Attenuation of Virus."

The second part concerns the various diseases that are accredited with a bacterial origin. Under this heading a full account is given of Pasteur's work in connection with hydrophobia. The question of bacteria cultivation is very fully considered. The volume concludes with a capital index and a copious bibliography.

The book is illustrated with 348 figures and 4 lithographic plates. The latter are disappointing. A large number of the figures in the text are printed in colors after the manner of the illustrations in Dr. Woodhead's well-known work. It is to the credit of British book art to note that these illustrations fall far below the excellent drawings in the work just alluded to.

La Syphilis Héritaire Tardive, by DR. FOURNIER (Paris, 1886), is an elaborate monograph forming a substantial addition to the literature of syphilis. It abounds in original matter, and is illustrated by valuable clinical material. It deals with hereditary syphilis as it appears in children, at puberty, and in adults. A chapter is also added upon acquired syphilis in young children.

Of osteoclasia we know little in England, and from DR. POUSSON'S point of view, as expressed in his brochure *De l'Ostéoclasie* (Paris, 1886), surgery suffers greatly from that ignorance. This operative measure has certainly developed vigorously upon French soil, and our chief knowledge of it comes from French surgeons. Dr. Pousson's book professes to give a complete account of the whole subject. It is perhaps needless to say that by osteoclasia is meant the forcible straightening of a bent bone, and that to effect a "*redressement*" a fracture is usually produced. It also includes the forcible fracturing of normal bones in certain cases of joint deformity. The author gives a full account of the various terrible looking instruments that are in use, and enters into the details of their working. He proceeds to point out the application of osteoclasia to certain diseased conditions, and supports his statements by a large series of clinical cases. He discusses the employment of the osteoclast in examples of vicious union after fracture, in rickety, curvature of long bones, in knock-knee, and in certain forms of ankylosis. The work, which appears to be very carefully written, concludes with a good bibliography, a very necessary appendix at the present rate of literary growth.

Nouveaux Éléments de Pathologie Externe, by PROF. BOUCHARD, is a new work on surgical pathology of which only the first fasciculus has been issued. The publishers engage to complete the work in four fasciculi at a cost that will not exceed twenty-four francs. It is an unpretentious volume, without any especial *raison d'être*. It has one conspicuous flaw—it lacks illustrations. Part I. deals with general subjects; with atrophy, hypertrophy, and the various degenerative processes. It then embraces inflammation and the healing process, and the whole subject of tumors. It concludes with an

account of the pathology of wounds. As a summary of the present state of pathological knowledge the book may be of value. The chapter on wounds is certainly excellent, and is written in a thorough and masterly manner. The sections on the complications of wounds and the effects of certain constitutional conditions upon wound healing are the best in the book, and contain much valuable material.

The following recent articles and publications, which cannot be noticed in detail, may be mentioned :

"Illustrations of Exceptional Symptoms and Examples of Rare Forms of Disease," by Jonathan Hutchinson, F.R.S. (*Brit. Med. Journal*, May and following months). This is a valuable series of interesting cases briefly reported.

"On the Affections of Joints which Complicate or Follow Scarlet Fever," by Dr. Henry Ashby (*Brit. Med. Journal*, 1886, vol. i. p. 971).

"Ligature of the Innominate Artery," by Bennett May (*Lancet*, 1886, vol. i. p. 1064). The patient, a man aged thirty-three, had an aneurism of the right subclavian. The innominate was ligatured. A ligature made up of six catgut threads was used. The spray and strict Listerian precautions were employed. The patient died of secondary hemorrhage on the nineteenth day.

"Pistol Wound of Abdomen; Complete Perforation of the Stomach; Recovery," by Dr. Clemon (*Lancet*, 1886, vol. i. p. 1109).

Manual of Pathological Histology, by Cornil and Ranvier, English edition, vol. ii. part ii. This volume completes this important standard work.

"Hereditary Deformity (Claw-foot and Claw-hand), Appearing in Five Successive Generations," by Dr. Fotherby (*Brit. Med. Journal*, 1886, vol. i. p. 975).

"Hereditary Deformity (Claw-foot and Claw-hand), Appearing in Four Successive Generations," by Mr. William Anderson (*Ibid.*, p. 1107).

"On the Treatment of Stone in the Bladder," by Mr. William Cadge (*Brit. Med. Journal*, June, 1886).

"The Treatment of Complicated Fractures of the Skull," by W. Wagner (*Sammlung klin. Vorträge*, Nos. 271, 272).

"On Neuropathic Joint Affections," by Prof. Czerny, of Heidelberg (*Bericht der deutschen Gesellschaft für Chirurgie XV. Congress*, p. 76). This article contains a full review of the subject, with much original matter. The *Transactions* of this Congress contain many papers of value and interest.

FRACTURE OF THE PATELLA.

An interesting review of the various methods of treatment of this injury is contributed by C. BRUNNER to the *Zeitschrift für Chir.*, Bd. xxiii. Hefte 1 and 2. In a very large number of cases treated with strapping, plaster-of-Paris cases, Malgaigne's hooks inserted into strips of gutta-percha, etc., the average stay in hospital was nine to ten weeks, the universal result firm fibrous union, and in two cases the fragments were again broken rather than the ligamentous band connecting them. One case of compound fracture in which antiseptic suture was employed resulted in bony union, another of primary resection died

of pyæmia. Puncture of the joint with a view to letting out the blood was tried in several cases without any ill effect, though in some it failed owing to coagulation. Ninety cases of suturing the fragments (of which half were done for old fracture) afforded no less than five deaths from pyæmia, three cases of amputation, nineteen of suppuration in the joint, fourteen of ankylosis, and many more of stiffness and greatly impaired movement. Passing a suture round the patella (through the quadriceps tendon and ligamentum patellæ) resulted in one death and two cases of suppuration out of a total of seven so treated. It is no wonder that the writer regards the old methods as being by far the most satisfactory, and the indications for operation by suture as very exceptional. We must own to an impression that the results of the new operations for fractured patella in England would be found to be less unfavorable than those at present recorded from Germany.

MR. F. TREVES, in the *British Medical Journal* of July 24, 1886, advocates the use of Malgaigne's hooks, applied in the original manner, under strict antiseptic precautions. The latter include the free use of iodoform and the exposure of the limb both night and day, so that the vitiated air under the bedclothes cannot have access to the part. Having carefully marked the position at which the hooks must enter, so as to grasp securely the fragments, he makes four punctures with a tenotomy knife, the upper two allowing the effusion to escape. No anæsthetic is required, the hooks are kept in position about six weeks, and the results hitherto have left nothing to be desired.

COMPOUND FRACTURE OF THE PATELLA.

MR. G. R. TURNER (*Lancet*, 1886, vol. i. p. 809) has collected twenty recorded cases of this injury, and in addition to an excellent summary of the results of treatment he gives a case under his own care. It was that of a man aged thirty-three. The fracture was transverse and due to direct violence. The joint was washed out with carbolic lotion and dressed with full aseptic precautions. No rise of temperature followed and the wound remained aseptic; in six weeks a small sequestrum came away and rapid healing followed. The patient can flex the knee very nearly to a right angle. The fragments are separated by about three-quarters of an inch when the limb is extended, but the man has good use of the joint. The following is the summary of 20 cases collected from various sources:

Total cases, 20. All recovered; 12 with good movement, 5 with slight movement. In 3 ankylosis occurred (1 after excision of the joint).

Antiseptic treatment (without suture): 9 cases, 7 recovered with good movement; 1 with partial movement, and 1 with bony ankylosis.

Antiseptic suture: 5 cases, 2 recovered with good movement and 3 with partial movement.

Carbolic oil to wound; 2 cases, recovery with good movement.

Lint soaked in blood applied to wound: 1 case, good movement.

Removal of patellar fragments, suture of quadriceps to ligamentum patellæ: 1 case, slight movement.

Excision of knee: 1 case.

Antiseptic treatment for a time: 1 case, fibrous ankylosis of joint.

In connection with this paper may be mentioned a case of compound com-

minuted fracture of the patella reported by MR. BRAMWELL (*Lancet*, 1886, vol. ii. p. 1102). The parts healed without operation and excellent movement was preserved in the articulation.

ON THE EARLY TREATMENT OF PROSTATIC RETENTION OF URINE.

MR. BUCKSTON BROWNE has published a somewhat elaborate paper on this subject (*British Medical Journal*, 1886, vol. i. p. 809). He points out the seriousness of the question of repeated catheterism in elderly men, and discusses the fever that so very commonly follows the practice. This fever (usually called urethral or catheter fever) the author believes results from urethral shock communicated to the sensitive excretory apparatus of the kidney through the nervous system, and causing all degrees of suppression of urine from the merely momentary up to the most complete. The more sensitive and cultivated the nervous system of the patient the more readily does he suffer from this fever. The amount of fever is proportionate to the amount and character of the instrumentation, and this, when made under the influence of morphia, is often followed by no fever in cases where fever is sure to follow if no drug be employed.

When retention exists in cases of prostatic enlargement catheters must, of course, be passed. They should be soft and small. The best is a No. 5 or 6 (Eng.) vulcanized India-rubber catheter (Jacque's patent). If this fails, a French coudée or bicoudée catheter. If still unsuccessful, the surgeon may try a very soft-ended olivary catheter or a large coudée instrument (No. 12 Eng.), or an ordinary gum-elastic catheter that has been stiffened by the stylet. The early treatment of prostatic retention by catheter is conveniently considered under three heads. 1. In cases where the prostate has only recently enlarged, and where the partial but habitual retention of urine does not amount to more than two or three ounces after every natural act of micturition; with proper care recovery should always take place. These patients become accustomed to the catheter and use it daily. 2. Cases where the patient is able to void urine, but is obliged to do so with much frequency, and there is a large area of hypogastric dulness on percussion, often do not come under notice until there is complete retention. They are always grave and sometimes almost hopeless. Morphia should be given before catheterism, and the whole of the urine not drawn off the first time. 3. There is a form of complete retention which may be termed the paroxysmal complete prostatic retention, in which the patient only occasionally requires catheterism, often going for long periods without the slightest need of the catheter.

Cocaine as a lessener of urethral shock during early catheterism is impracticable.

HYPERTROPHY OF THE PROSTATE.

According to SIR HENRY THOMPSON (*British Medical Journal*, 1886, vol. i. p. 1156), a healthy prostate is made up (1) of pale muscular fibres, connective tissue, and the yellow elastic fibres—stroma; (2) of simple gland cavities and their ducts. In addition to these elements a quantity of secretion, more or less abundant, is always present; besides which certain bodies, known as "prostatic concretions" are always met with.

The prostatic enlargement of advancing years may be classified as follows:

A. Over-development of tissues, glandular and stromal, mostly in normal relations throughout—"true hypertrophy."	An uncommon form. Degree of enlargement not considerable.	Secretion abundant, Concretions numerous.
B. Increase of stroma, chiefly of connective tissue, and not of muscle—"fibrous hyperplasia." If the muscle element is developed in like proportion—"fibro-muscular hyperplasia."	The most common form. Attains the largest size.	Secretion varies with amount of gland tissue present. A few concretions.
C. Excess of gland tissue over stroma—"glandular hyperplasia."	Rare.	Secretion and concretions abundant.
D. Rearrangement of the normal structures, fibrous and glandular, in the form of tumor.	Common.	

HERNIA INTO THE FORAMEN OF WINSLOW.

An example of this very rare condition is furnished by MR. SQUARE (*Brit. Med. Journ.*, 1886, vol. i. p. 1163). The patient was a man, aged twenty-five. He was seized suddenly with symptoms of acute obstruction—collapse, pain, colic, and vomiting. No operation was performed. The vomiting became feculent, and the patient died after an illness of three days and seventeen hours. The autopsy revealed slight peritonitis. Eight inches of the ileum at a spot about two feet from the cæcum were firmly incarcerated in the foramen of Winslow. The foramen admitted two fingers. The cæcum was very movable, and attached by a meso-cæcum.

TREPHINING FOR INTRACRANIAL ABSCESS.

MR. HULKE (*Lancet*, 1886, vol. ii. p. 3) deals with that form of abscess which occurs in connection with suppuration in the ear. These abscesses are frequent, and nearly always fatal. There is much difficulty in diagnosis. The clinician cannot yet with certainty distinguish between meningitis, thrombosis of the cerebral sinuses, and abscess in the cerebrum or cerebellum. The author, without entering into the question of differential diagnosis, observes that two symptoms especially characteristic of otitic intracranial abscess are an abnormally slow pulse and a low temperature. Three cases are given.

1. Male, aged forty-five. Chronic otorrhœa, caries of the petrosal; intense earache and headache, attended by vomiting, and later by unconsciousness and loss of control over sphincters; abscess erroneously supposed to be in the temporo-sphenoidal lobe; that lobe was punctured after trephining. Death next day. Abscess discovered in cerebellum.
2. Female, aged nineteen. Chronic otorrhœa; polypus; trephining; abscess in the temporo-sphenoidal lobe. Death on the seventh day.
3. Female, aged fifty-five. Chronic otorrhœa; intense earache and headache, followed by cerebral symptoms, and finally by coma. Trephining through the occipital bone, and the evacuation of an abscess of the cerebellum. Death on the following day.

Mr. Hulke concludes with these words: "We must strive at perfecting the early diagnosis of abscess, and this once made, we must boldly, and without hesitation, apply the same general principles of surgery which govern the treatment of abscess in any less noble part of the body."

REST IN THE TREATMENT OF SCROFULOUS NECK.

MR. TREVES (*Lancet*, 1886, vol. i. p. 1060) urges the systematic employment of rest in all inflammatory affections of the neck, claiming for the neck the same privileges in this direction that other parts of the body enjoy. It is needless to point out that scrofulous gland swellings in the neck, together with scrofulous abscesses and the sinuses that result therefrom, are as a rule very chronic in their course, and very obstinate in their relation to treatment. There is little in the anatomy of the neck to account for this. The neck, however, is a part of the body that is in almost constant movement, and if rest is of real import in the treatment of inflamed tissues, then there can be few parts of the body where it is more clearly demanded than in this place. If in the axilla or groin there be a glandular swelling, or a chronic abscess, or a lingering sinus, the first injunction to the patient is an injunction "to rest." The author employs rest as a routine measure in all inflammatory conditions and after all operations upon the part. The neck is fixed by means of a light felt splint that takes its hold from the shoulders and the occiput. This splint has been worn continuously for months. It is used in cases of scrofulous disease both before and after suppuration has appeared, and as an adjunct to the various operations performed for this disease. Very distinct benefit is claimed for this simple addition to treatment.

ANTISEPTICS.

The immense stride which iodoform and corrosive sublimate have made in general favor is emphasized by various contributions to the recent literature of antiseptic treatment.

DR. KÜMMELL, of Hamburg, having employed perchloride of mercury solutions (in varying proportions from 1:1000 to 1:10,000) in upward of a thousand operations, speaks of it in the most favorable terms.

In one case of amputation of the breast he met with toxic symptoms of a mild nature, and in two abdominal operations the antiseptic produced very grave phenomena, ending in one case fatally. He records them in the *Centralblatt für Chirurgie*, of May 29, 1886. The first was a woman aged thirty, from whom he excised a large uterine fibroma, using during the operation a solution of 1:5000 of perchloride. Sanguineous diarrhœa, spongy gums, increasing prostration, and a normal temperature formed the chief evidence of toxic effects. The patient died on the fourth day, and at the autopsy recent ulceration of the ascending colon was the only lesion observed. In the second case (double ovariectomy on a patient aged twenty-five) the same symptoms rapidly supervened, and the collapse was so severe that venous injection of a saline solution was resorted to with the most happy result. The diarrhœa and mercurial stomatitis gradually subsided and the patient made a good recovery. Kümmel advises that in abdominal operations on anæmic patients or on those with some renal complication, another antiseptic than the sublimate should be used, or sterilized water alone employed.

A good deal of discussion as to the best antiseptic material for the battlefield has lately been held in Germany, and DR. VON LESSER (*Centralbl.*, July 3, 1886) points out the great merits of iodoform wool and powder, which were largely used in the latest European war, that between Servia and

Bulgaria. The lightness, distinguishing odor and color, stability, and comparative harmlessness of iodoform are all points in its favor, apart from its undoubted value as an antiseptic.

VON MOSETIG-MOORHOF (*Wiener med. Wochenschrift*, 1886, No. 16) conducted the treatment of over eight hundred gunshot wounds and compound fractures in the late campaign, and whilst using iodoform throughout, observed no toxic symptoms resulting therefrom. The statistics given appear very favorable (tetanus being one of the chief causes of the mortality), but the uncertain value of mere numbers as a test will excuse further comment upon them. In the German Military Hospital at Belgrade DR. FRÄNKEL (*Wiener med. Wochenschrift*, 1886, Nos. 11-14) was able, by the aid of antiseptics (iodoform, corrosive sublimate, and carbolic acid), to carry out conservative treatment with most brilliant results. Out of one hundred and fourteen gunshot fractures (many involving the larger joints) not one required amputation, and the writer strongly urges in all such injuries antisepsis with partial resection, if required, in preference to major operations.

A new antiseptic (iodol) is commended by SCHMIDT (*Berlin. klin. Woch.*, 1886, No. 4) as being equal to iodoform and free from the latter's disagreeable odor.

THE ANTISEPTIC TREATMENT OF ERYSIPELAS.

DR. HABERKORN contributes in the *Centralblatt für Chirurgie*, May 8, 1886, a short but emphatic recommendation of benzoate of soda as an internal remedy for erysipelas. He treated fifty cases with this drug, giving 300 grains daily, and asserts that in nearly every one the temperature fell and the local symptoms improved within about twenty-four hours from the commencement of the treatment. No local measures were employed. The method recommended has certainly advantages in respect to the patient's comfort over carbolic acid injections, scarification, etc.

INTESTINAL OBSTRUCTION DUE TO GALL-STONES.

As an appendix to the account of a fatal case of large gall-stone impacted in the ilium, WISING reviews the record of fifty cases (*Nord. med. Ark.*, Bd. xviii. No. 18). He points out with regard to diagnosis the great preponderance of female patients (three out of every four cases), their advanced age (usually over fifty), and the frequent previous occurrence of jaundice, biliary colic, and localized peritonitis. The symptoms, however, of the stone passing into the small intestine (especially the duodenum) may be very slight. When the stone becomes impacted the early onset of vomiting, the absence of distention in the colon, and detection of the mass under an anæsthetic, aided perhaps by exploration with a needle, may lead to a certain diagnosis. The mortality of obstruction due to gall-stones is probably at least eighty per cent., and even if the obstacle finds its way into the colon the damage done to the intestinal wall may have given rise to subsequently fatal ulceration or stricture. In three cases massage or palpation was successful in dislodging the stone, whilst all of the four in which laparotomy was done proved fatal. The free use of enemata and opiates is advised, and the author dissuades from early resort to operative measures.

ON FRACTURES AND DISLOCATIONS.

PROF. BRUNS (*Tübingen klinik.*, Bd. ii. Hft. 1. p. 1) has collected the records of thirty-five cases of embolism of the right heart or lungs, thirty of them ending fatally. Fractures of the leg produced the lesion in twenty-four cases, of the thigh in seven, the humerus in three, and the patella in one case. The transfer of the embolus was probably brought about in several examples by movement of the limb, and in one case the accident happened no less than ten weeks after the fracture.

F. MÜLLER (*Ibid.*, p. 19), from a large number of statistics, concludes that after simple fractures a rise of temperature, lasting a few days, occurs in eighty-five per cent. of the cases. The age of the patient, the amount of extravasation, etc., could not be traced to have any effect upon the slight amount of fever.

TREATMENT OF COMPLICATED FRACTURES OF THE LONG BONES.

BIRCHER (*Bericht des deutschen Chirurgen-Kongress*, April, 1886) has employed ivory rods and clamps in compound fractures and cases of pseudoarthrosis, under strict antiseptic precautions. If the fracture is through the diaphysis he inserts the peg into the medullary canal of either fragment, if through cancellous tissue he chisels a groove for one limb of the clamp to lie in. Of five cases reported the result was very favorable. The ivory is removed at the end of some weeks. The violence done to the bone in the latter proceeding as well as in the insertion of the peg, etc., will probably render the cases in which this treatment is adopted very limited in number.

HAUSMANN (*Ibid.*) advocates for similar cases the use of screws which are passed through a metal (nickelled steel) strip in which a row of holes has previously been made, and which is laid upon the fractured bone. The screws, which have long handles for the purpose of removal, are driven into the fragments, one on either side of the line of fracture. In twenty cases of complicated fracture in which this method was adopted at Hamburg, a good result was obtained, the apparatus being removed at the end of one or two months.

DISLOCATION OF THE RADIUS WITH FRACTURE OF ITS HEAD.

W. WAGNER (*Ibid.*, p. 93) has observed two cases of dislocation of the radius outward, in which there was good reason to believe that the inner border of its head had been broken off by forcible impact against the capitellum. The patients were young adults, and the lesion was produced by a violent impact against the elbow, the forearm being flexed and pronated at the time. Great limitation of movement and bony thickening of the radial head followed, and led to its successful excision in each case. Löbker, of Greifswald, alludes to the complication of the outward dislocation, and states that in two cases he has known the small splinter of bone form a "joint-mouse."

RESECTION OF A CANCEROUS ŒSOPHAGUS.

MIKULICZ (*Prager med. Wochenschrift*, 1886, No. 10) succeeded in resecting the upper end of the œsophagus for carcinoma in a woman aged fifty. After

preliminary tracheotomy and the usual incision for œsophagostomy, the lower end of the canal was secured to the skin wound. Four months later obliteration of the fistula was obtained by a further operation, and it was not until two months more had elapsed that a recurrence of the growth was noticed, and this proved fatal about a year after the first operation. It is interesting to note that the patient's mother died of cancer of the stomach.

LARYNGECTOMY FOR MALIGNANT DISEASE.

DR. DAVID NEWMAN (*Lancet*, July 24, 1886) records a most successful case of excision of the larynx for an epitheliomatous ulcer extensively involving that organ. The patient was a man aged thirty-seven, and after an artificial phonatory apparatus had been supplied he was able to talk well and to return to his occupation as a confectioner. Six months after the operation there was no sign of a recurrence. Preliminary tracheotomy, the insertion of a large tube plugging the trachea and preventing the descent of blood into the air-passages, division of the canal at its lower part first and subsequent section of the upper thyroid cornua and epiglottis after the thyroid cartilage had been bared, and the slight amount of hemorrhage were the chief features of the case. An œsophageal tube was introduced through the wound and kept there for some days, the patient being ultimately able to swallow solid as well as liquid food without difficulty.

TOXIC SYMPTOMS FROM COCAINE.

G. BOCKL (*Deutsche Monatsschr. für Zahnheilkunde*, February, 1886) observed once out of some one hundred and forty cases of tooth extraction under cocaine alarming symptoms follow its use. He had injected six drops of a twenty per cent. solution into the gums and removed the tooth without pain. Ten minutes later the patient's gaze became fixed, and there was temporary visual defect, with slight delirium. Inhalation of nitrite of amyl quickly put an end to these symptoms, nor were there any bad after-effects. In a similar case reported by SCHILLING, of Nürnberg, in which the nervous symptoms were more marked, the effect of amyl nitrite was equally decisive.

ON THE RESULTS OF OPERATION FOR CANCER OF THE LIP.

Amongst the valuable monographs lately derived from Professor Brunns's clinic at Tübingen is one by A. WÖRNER, dealing with 300 cases of cancer of the lip, of which 277 underwent operation. About ten per cent. were in women, five per cent. affected the upper lip, and in one case both upper and lower were involved. The mortality after operation, chiefly from hypostatic pneumonia, amounted to six per cent. Nearly sixty per cent. of the cases had no recurrence at intervals of from five to eight years; of the remainder, the disease returned, in the great majority, within a year. Wörner appends further statistics of other German operators, and these give a much less favorable view of the operation.

REMOVAL OF SEBACEOUS CYSTS.

DR. C. LAUENSTEIN (*Centralblatt für Chirurgie*, June 26, 1886) advocates making the incision away from the highest part of the cyst, and hence that

at which the skin is most adherent; then, with the knife handle, separating the cyst wall from the surrounding tissues. After prolonging the cut over the centre, he removes the tumor in the usual way, claiming that by this method there is little risk of rupturing the sac at its thinnest portion.

THE TREATMENT OF MALIGNANT NEW GROWTHS WITH ARSENIC.

F. KÖBEL (*Mittheilungen aus der Klinik. zu Tübingen*) gives some materials for forming an opinion as to the value of the free use of arsenic in cases of malignant tumors, especially lymphoma or lympho-sarcoma. In a case of the latter, a man aged thirty-six, who had multiple growths in one axilla, over the clavicle, close to the spine, etc., subcutaneous local injection of arsenical solutions, together with its administration by the mouth, resulted in suppuration and ultimate disappearance of the tumors. Two subsequent tumors were treated in the same way, and for three years the patient has remained free from any recurrence. Against this one successful case must be placed seven in which the treatment had no result; nor did it once succeed in cases of epithelioma, etc. Collecting from other writers the records of over fifty cases of lymphoma treated with arsenic, we find in a considerable proportion diminution of the tumor, but hardly any of what could be called, even by the most sanguine, a cure.

SPITZER and HERMANN (*Wiener med. Blätter*, 1886, No. 8), after treating several cases of epithelioma and lupus with the application of lactic acid, conclude that it is a very painful and slow method, and that it in no way selects the diseased tissues from the sound ones.

EXTIRPATION OF TUMORS OF THE GROIN.

M. KIRMISSON treats this subject in the *Revue de Chirurgie*, May 10, 1886. The chief question of interest relates to the dangerous proximity of those tumors extending beneath the fascia lata to the femoral vessels, and it is argued that if necessary it is quite legitimate to denude either vein or artery. If this is done, however, the danger of strong antiseptic solutions (such as those of chloride of zinc) causing ulceration of the vessel-walls should be borne in mind. Should the vein be accidentally wounded two courses are open—to ligature it above and below, or to add to this proceeding ligature of the artery. Experience shows conclusively that the latter is not to be recommended, as it favors the occurrence of gangrene. If the peritoneum be wounded, as has occurred occasionally, it should be sutured.

The author comments on the great liability of these operations to be followed by erysipelas, and to the danger of suppuration causing secondary hemorrhage, and concludes an interesting paper by an appendix of cases and a good bibliography.

CYST OF THE PANCREAS.

F. SALZER (*Zeitschrift für Heilkunde*, Bd. vii.) narrates a case of this rare disease, occurring in a woman aged thirty-two, in which the large fluctuating tumor was diagnosticated as an ovarian cyst and its removal attempted. During the operation a large adherent artery which had been supposed to run in the abdominal wall, required ligature with its companion vein, and they

proved to be the splenic vessels. Much difficulty was experienced in removing the cyst, and the patient died on the sixth day of suppurative peritonitis. It is interesting to note that no changes were found at the autopsy in the spleen, this fact being attributed to the previous establishment of collateral circulation through its capsule. The formation of the cyst was first noticed during convalescence from "typhus fever." Cf. the recent work of N. Senn on the subject of cysts of the pancreas.

EPITHELIOMA OF THE BREAST.

PROF. CZERNY reported to the Congress of German Surgeons (April, 1886) a case of "plexiform carcinoma of the rete Malpighi" originating in the skin of the left breast of a woman aged fifty-three. The supra-clavicular glands were affected, and were excised together with the breast. Six months later a small recurrence near the scar required a further operation. Czerny points out the distinguishing features of this case from those of "Paget's disease of the nipple."

OSTEOCHONDRO-SARCOMA OF BREAST.

An example of this very rare mammary tumor has been published by MR. BATTLE (*Lancet*, 1886, vol. i. p. 975). The patient was a widow, aged seventy-three, and had had five children. The tumor began as a small lump on the inner side of the nipple six years ago. It remained stationary and of the size of a pea for two years. During the ensuing three years it increased to the size of a hazelnut, and then grew more rapidly. When admitted into St. Thomas's Hospital the tumor was the size of an orange, painless, and of hard consistence. The skin over it was movable, except at the inner part, where it was adherent and red and tense. The nipple was much retracted. A small, freely movable gland was detected in the axilla. The breast was amputated and the patient did well. The tumor on examination appeared to be composed of two parts. The larger part was soft, friable, and very vascular; the smaller segment was very hard and resembled bone. Microscopically the softer parts were composed of round and spindle cells, the harder, of cartilage which in places had ossified, with the development of Haversian systems.

ABSCESS IN THE ANTRUM OF HIGHMORE.

MIKULICZ (*Bericht des Kongress*, p. 23) advocates perforation of the antral wall from the inferior nasal sinus, using for this purpose a special instrument. He has employed this method with success once, and has repeatedly proved its practicability on the dead subject. He argues that the usually adopted sites for perforation of the antrum are inconvenient and the aperture difficult to maintain open, and that his method possesses distinct advantages in these respects.

ZIEM (*Monatsschrift für Ohrenheilkunde*, 1886, No. 2) holds that many cases of persistent ozæna and nasal blenorrhœa are kept up by disease of the mucous membrane lining the antrum. The symptoms of this complication are very vague, and in no less than twenty-nine cases out of a total of thirty-seven in which he perforated the anterior wall he found pus in the cavity. Its frequent irrigation led in eight of these to a complete cure and in thirteen to improvement.

TETANUS.

The belief that this disease is due to a blood infection, possibly of microbic nature, is steadily gaining ground. Several observers (Carle, Rattone, and others) have succeeded in inoculating dogs with tetanus and in transferring the disease from one animal to another. Nicolaier, during researches on the microbes in earth, noticed tetanic symptoms develop in several of the animals experimented on; and Socin, of Basle, has lately confirmed this. ROSENBACH (*Gesellschaft für Chirurgie, Kongress*, April, 1886) produced fatal tetanus in mice and dogs by the subcutaneous injection of matter taken from the wound which had caused the disease in a man, the experiments being conducted an hour after the death of the latter. The incubation period was usually thirty-six hours, and the symptoms commenced near the part injected, spreading later to the whole body. The identity of the "tetanus bacilli" with those of the so-called "earth tetanus" was demonstrated in Professor Koch's laboratory on April 10th. They are described as being of bristle-shape, and they have been observed in the spinal cord and sciatic nerve of tetanic animals.

IN AMERICA.

SUPRAVAGINAL AMPUTATION OF THE UTERUS FOR UTERINE FIBROIDS.

In a paper read before the New York Surgical Society (*Medical News*, June 12, 1886), DR. F. LANGE reports seven cases of uterine fibroids. In three of these he performed amputation of the uterus, in one he removed the tumors only, and in three recovery ensued after sloughing of the tumors. The cases in which he removed the uterus all recovered. In that in which the tumors only were extirpated, death ensued on the third day from peritonitis apparently caused by infection from a necrotic tumor.

Dr. Lange has preferred amputation of the uterus, in all his cases, to removal of the ovaries. He advocates a free abdominal incision, considering that it does not increase the danger of the operation, while hemorrhage is more quickly checked, and the use of undue force avoided. To secure the stump he employs the elastic ligature passed beneath the peritoneum. He thus explains his method of using it: "Imagine both broad ligaments being tied, there exists, on either side of the uterus, close to the edge, an opening through which the most median ligature of the broad ligament has been passed. Between these two openings the elastic ligature is passed, underneath the peritoneal covering, first on the anterior then on the posterior side of the uterus, and tied at the point of introduction." The ends of the ligature he secures with silk. Having amputated the uterus about three centimetres above the ligature, he excises the tissues of the stump in the form of a funnel, which he closes with deep catgut sutures. Thus is obtained a source of blood supply for the stump which is left within the peritoneal cavity.

The cases in which sloughing of the tumor occurred required surgical interference to remove the necrotic masses through the vagina, or by incisions and

scraping, with thorough irrigation. In one of these the tumor filled nearly the entire abdomen, in another it reached nearly to the umbilicus. Ergot was used in all the cases, hypodermatically and by the stomach; but in only one did it appear to bear any causal relation to the death of the tumor. In one case sloughing of the tumor seemed to be caused by violence done to it in an attempt on the part of the patient to save herself from falling. Only two of the patients were near the menopause. For irrigation of the uterine cavity a solution of corrosive sublimate, 1 to 2000, and the borosalicylic solution, prepared according to Thiersch's formula, were used. In addition to the discharge of portions of tumor from the interior of the uterus, in one case an abscess formed posteriorly, and was opened through the vagina; and in another an abscess presented anteriorly in the retroperitoneal space below the umbilicus, and was opened through the anterior abdominal wall. The course of these cases was protracted over several months, but ultimately recovery was complete.

ALEXANDER'S OPERATION.

DR. WILLIAM M. POLK published, in the *Medical Record* for July 3, 1886, a paper read before the New York Academy of Medicine, reporting fifteen cases of the operation for shortening the round ligaments of the uterus. The indications for the operation he states as follows:

"Prolapse of the uterus; retroversions and retroflexions of the uterus, in which the organ can be placed in the normal position, and yet a pessary cannot be comfortably worn; prolapse of the ovary, the organ being reducible, and not large enough or diseased enough to demand removal."

He performed the operation in two cases where the uterus was bound down by adhesions, and in both the result was unsatisfactory, the uterus returning to the position it occupied before the operation. In one case he was able to maintain in a position of anteversion a uterus which had been held down by a fibroid tumor on its posterior aspect. Pregnancy occurred subsequent to the operation in one case, and, at the time of the report, had gone on to the sixth month without unusual symptoms except a dragging pain along the round ligaments. In none of the cases had unpleasant bladder symptoms followed the operation. In three cases of prolapse of the uterus, in one of which that organ lay entirely without the vulva, the results were so satisfactory as to lead Dr. Polk to advise shortening of the round ligaments before attempting repair of the perineum, and he infers that, as compared with perineorrhaphy alone, this operation is preferable.

In the paper he gives a full description of the operation. To hold the uterus in position during the operation he employs a sound with as large a bulbous extremity as can be passed to the fundus, and the organ is supported for a time afterward by cotton tampons. He does not consider it necessary to use a pessary after the operation. By actual experiment he proves that the round ligament will bear, without breaking, a weight of from four to five pounds, and that it does not stretch until a weight of two or three pounds is attached.

LAPAROTOMY FOR SUPPURATIVE PERITONITIS.

DR. R. J. HALL read a paper before the New York Clinical Society, reporting a case of suppurative peritonitis due to ulceration and perforation of the

vermiform appendix, in which he performed laparotomy, resecting the appendix and draining the peritoneal cavity (*New York Medical Journal*, June 13, 1886).

The patient, already suffering from phthisis, had had a right oblique inguinal hernia since childhood. He had had symptoms of intestinal obstruction for two weeks before he came under observation, and for three days the hernia had been irreducible, and had become swollen, red, intensely painful, and tender. The whole abdomen was painful, but not distended. When operated upon, he was almost in a condition of collapse. The incision for hernia was made, and a sac opened which contained the vermiform appendix in a state of chronic inflammation lying in a quantity of fetid pus. The cæcum and attached portion of the ileum were found near the internal ring, bound together by recent adhesions and bathed in pus. There was a perforation of the appendix near its base. The appendix was ligated and removed; the original incision was enlarged upward, and the hand and forearm introduced into the peritoneal cavity to break down adhesions and remove pus. The cavity was cleansed with sponges wrung out in borosalicylic solution, and a long drainage tube inserted among the intestines. In spite of the unpromising condition of the patient, he made a good and speedy recovery.

Dr. Hall places much stress on the free drainage of the peritoneal cavity in such a case, and states that for irrigation he would prefer simply warm water.

INTUBATION OF THE LARYNX.

DR. JOSEPH O'DWYER reports, in the *Medical Record* of June 5, 1886, a case of chronic stenosis of the larynx treated with his method of intubation.

The patient, a woman forty years of age, had contracted syphilis twelve years before she came under his observation. For two years the voice had been husky, and she had suffered from dyspnœa and stridor on slight exertion, with at times "severe suffocative attacks." The glottis was narrowed by cicatricial contraction, the result of ulceration, and by a band on the left side which nearly closed the opening. There was also, probably, subglottic stricture. Tracheotomy had been already advised.

The tube was first introduced on December 5th and was worn for fifty-six hours, the patient experiencing much relief. From this time until December 23d a tube was worn at intervals, and an examination of the larynx on January 3d, no tube having been worn for eleven days, showed that the cicatricial membrane had almost entirely disappeared. The dyspnœa had been entirely relieved. After a period of six weeks, there being some return of the trouble, the tubes were again introduced at intervals. At the date of the report the patient was wearing the tube during one night only in every two weeks and the period of intermission was being lengthened. Four tubes, of different sizes, were used upon this case, the largest measuring at the neck one-half inch in the antero-posterior diameter and one-fourth inch in the transverse diameter.

The results obtained certainly compare favorably with other methods of dilating the glottis, both in the time required and in the result attained.

In the report of the proceedings of the Chicago Medical Society, published in the *Journal of the American Medical Association*, July 17, 1886, statistics of eighty-three cases of intubation of the larynx for pseudo-membranous laryn-

gitis are given by DR. FRANK E. WAXHAM. There were among these twenty-three recoveries. The ages ranged from nine months to eleven years. Thirty-nine cases with eleven recoveries were under three years of age. Twenty cases are reported as actually moribund when intubation was performed, and all were such as to be hopeless without surgical interference.

ON FATTY AND SARCOMATOUS TUMORS OF THE KNEE-JOINT.

In a paper read before the Practitioners' Society, DR. ROBERT F. WEIR reports three cases of operation for movable tumors of the knee-joint (*Medical Record*, June 26, 1886).

In the first case, the tumor being a lipoma, there was a history of repeated effusion into the joint with some tenderness. The tumor presented near the ligamentum patellæ and was movable to a limited extent. In removing it an attempt was made to take away as much of the pedicle as possible and the joint was considerably manipulated. Although strict antiseptic precautions were observed and drainage established, suppurative synovitis set in, a peri-arthritis abscess formed, and finally amputation had to be performed in the middle of the thigh. The unfortunate termination was attributed to the attempt to remove too much of the mass, and in subsequent cases only the tumor proper was removed, the pedicle being left.

The second and third cases reported were similar to the first in clinical features. In both the unpleasant symptoms were confined to occasional attacks of pain in the joint with, in one, fixation at times. In both the tumor was easily removed; the incisions were left open, and both did well under antiseptic dressings.

The largest of the three tumors measured one inch and a half in length, one inch in breadth, and nearly three-fourths of an inch in thickness. Two of the tumors proved, on microscopic examination, to be sarcomatous.

Dr. Weir has been unable to find on record but one other case of movable sarcoma of the knee-joint, although he refers to eight cases of lipomatous tumors.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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EXPERIMENTAL INVESTIGATIONS OF INTRAOCULAR TENSION.

HÖLTZKE (*Bericht der 17ten Versammlung der Ophth. Ges.*, 1885) has gone over the ground of experimental investigations as to the effects of certain alkaloids upon intraocular tension, and states the following facts:

Physostigmin and pilocarpine, in solutions of the ordinary strength, dropped into the conjunctival cul-de-sac, increase the pressure in the anterior cham-

ber, though pilocarpine does this to a much lower degree than physostigmin; but through the active contraction of the pupil caused by both of them a marked lowering of the general intraocular tension is produced.

Atropine lowers the tension in the anterior chamber, but by means of the mydriasis which it produces, a distinct increase of the general intraocular tension is produced.

Höltzke thinks that when, in the human eye accommodated for the near point, no difference is detected between the tension in the vitreous and the tension in the anterior chamber, it may be explained by the fact that by a purely mechanical muscular action the tension in the vitreous during accommodation is increased; this over-tension is immediately equalized by an advance of the lens. As a result of his investigations, he formulates the law that the intraocular tension under normal conditions is always dependent upon the blood-pressure.

CAPSULECTOMY AND A NEW CAPSULECTOTOME.

TELNIKIN (*Annales d'Ocul.*, Jan.-Feb. 1886) has devised a new instrument for tearing through false membranes by punching without any traction, by cutting in the field of the pupil an opening two millimetres wide, and drawing out the resected portion with the instrument; the vitreous humor being retained in place during the operation by the blade of the instrument. The capsulectotome is introduced closed through the wound of the original extraction, until the point has reached the field of the pupil, and it is then pushed behind the false membrane. Pressure on the pedal or stop is then withdrawn, which causes an obturator to project through a window in the blade, making with the latter a sort of duck's bill slightly open. If the blade of the lance is then pushed forward, the false membrane falls into the grasp of the bill, which is then closed by pressure on the pedal or stop, thus closing and cutting out the piece of false membrane. The instrument is then withdrawn.

THE PHYSIOLOGICAL AND PATHOLOGICAL ACTION OF COCAINE.

PFLÜGER was incited to write this paper by observing some unfavorable results following the use of cocaine (*Kl. Monatsbl. f. Augenheilk.*, May, 1886). He describes two different kinds of corneal opacities, due to cocaine, viz., 1. That form of opacity which starts from the edge of the wound and extends into the corneal tissue, and disappears in from one to two weeks without causing any damage. This is probably dependent upon a deposit or precipitate formed by the union of the cocaine with the lymph. 2. That form of opacity which is accompanied by a long-continuing hypotonus and anæsthesia of the cornea, and sometimes by an obstinate vesicular formation on the cornea. In order to determine the mode of action of cocaine Pflüger propounds two questions: 1st. Is the anæsthesia of the cornea due to direct action of the drug upon the terminal filaments of the trigeminus, or is it caused by a lowered nutrition of these nerves in consequence of a narrowing of the vessels and obstruction to the lymph circulation in the cornea? 2d. Is the dilatation of the pupil due to paralysis of the sphincter in consequence of ischæmia of the muscular tissue, or to irritation of the sympathetic fibres which innervate the dilator muscle? All his own observations and ex-

periments lead him to espouse Zeglinski's conclusions that cocaine dilates the pupil not by paralyzing the sphincter but by irritating the dilator muscle of the iris, and is entirely independent of any contractile action exerted on the bloodvessels. Cocaine produces no effect on the iris of pigeons' eyes, which is exactly like that of mammals. One of the proofs that cocaine dilates the iris by irritating the sympathetic nerves of the iris is that it increases the mydriasis produced by atropine.

A REMARKABLE CASE OF EXOPHTHALMOS.

MOTAIS reports a very remarkable case of exophthalmos occurring in a woman aged forty-three (*Annales d'Oculis.*, Jan.-Feb. 1886). The patient, after a slight illness of two or three weeks, was suddenly attacked by fever, violent cephalalgia in the right temporo-frontal region, and finally coma, which lasted twenty-four hours. When she regained consciousness there was such a degree of exophthalmos of the *right* eye that the organ was completely luxated outside of the lids, while the head symptoms had entirely disappeared. Three weeks later optic neuritis occurred in the *left* eye without any other symptom, but three weeks after this, or forty-four days after the occurrence of the exophthalmos on the right side, she was attacked by fever, left cephalalgia, coma, and exophthalmos of the *left* eye. All cerebral symptoms subsided, and slowly but steadily the double exophthalmos disappeared. At no time was there any symptom of arterial or arterio-venous aneurism. As a cause of the phenomena, Motais suggests thrombosis of the ophthalmic vein and cavernous sinus.

AN EXPERIMENTAL CONTRIBUTION TO THE DOCTRINE OF GLAUCOMATOUS EXCAVATION.

LAKER (*Kl. Monatsbl. f. Augenheilk.*, May, 1886) propounds two questions which have an intimate bearing on this subject: 1. Has an increase in the intraocular pressure above the normal the power to produce a so-called pressure excavation in the optic nerve of a healthy eye? 2. Does the experiment upon the eye itself favor the assumption that the diminution of an abnormally increased intraocular pressure may possibly lead to a deepening of an already existing excavation, or even produce it? Laker's experiments were very carefully carried out, and led him to the following conclusions: The eyes which were submitted to an increased intraocular pressure, showed a distinct and very considerable curved or arched or concave yielding of the lamina cribrosa, beginning exactly at the scleral ring. From this he concludes that an abnormally increased intraocular tension acting for a certain period upon the unchanged eye of a cadaver produces the same changes as are found in a glaucomatous excavation.

MODIFIED SCLEROTOMY IN CASES OF CORNEAL STAPHYLOMA WITH PERSISTENT PROLAPSE OF THE IRIS.

In cases of this character INONYE (*Rev. Gén. d'Ophthal.*, March 31, 1886) recommends sclerotomy with subsequent reopening of the wound. He uses a narrow Gräfe knife, and makes his puncture in the cornea one millimetre from the corneal margin, and as far removed as possible from healthy cornea,

and the counter-puncture in the sclerotic one millimetre from the corneal margin. The incision should be six or seven millimetres long, and should cut the corneal margin at an angle of about twenty degrees. A compressive bandage is then applied. Twelve hours later this is removed and the wound reopened. This reopening of the wound is repeated a number of times, and then the pressure bandage is reapplied and left undisturbed for a number of days. When a firm cicatrix has been formed, an iridectomy may then be done if deemed desirable.

INJECTIONS AND DRESSINGS OF ESERINE AND OCULAR ANTISEPSIS.

WECKER (*Annales d'Oculistique*, March-April, 1886) is a strong advocate of the use of eserine in ophthalmic surgery, even to injecting it within the anterior chamber. He considers that the quantity of liquid that may be injected after the extraction of a cataract depends essentially upon the state of tension of the eye. For the purposes of injection he makes use of a small aspirator, in which the pressure or suction is exerted by the finger upon a thin rubber membrane or drum-head stretched across the top of the glass bulb of the aspirator. He makes use of a solution containing 0.25 per cent. of salicylate of eserine. In preparing for an extraction, he first carefully disinfects the lids, and especially the ciliary margins, with a solution of mercuric bichloride (40 centigrammes to the litre), and then injects a stream of the same solution over the cornea and into the conjunctival culs-de-sac. He then makes the usual corneal incision, and by means of the "pince-cystitome" he removes a piece of the anterior capsule without injuring the iris. At the same time he dislocates the lens and removes it through the wound, and then carefully cleanses the wound. Previous to this, the speculum or elevators are removed, and the lids are held apart by the fingers of an assistant. He then introduces the canula of his aspirator into the wound, and injects into the anterior chamber as much of the eserine solution as may be necessary to cleanse it of all blood-clots and fragments of lenticular cortex. When the pupils are clear and black, he disinfects the wound by a stream of mercuric bichloride solution as before, and also the culs-de-sac and lids. The eserine prevents all danger of prolapse of the iris.

DIAGNOSIS OF SIMULATED UNILATERAL AMBLYOPIA.

CHAUVEL (*Recueil d'Ophthalmologie*, April, 1886) has devised a modification of Flêes's apparatus for the detection of simulated unilateral amblyopia. The rectangular box is, by a hinged cover, absolutely divided into two equal parts, and kept in place by hooks. It is easily opened, and the interior parts may be changed at will. It is 33 centimetres long and 20 centimetres wide. The posterior wall or bottom of the box is formed by a plate of glass on which are fastened two printed cards, with the dimensions according to Perrin's scale, and separated by an interval of 0.01 of a metre. Illuminated by transmitted light, like the test-plates of all optometers, the characters are distinguished with extreme precision. The anterior wall of the box is furnished with two eye-pieces, separated by the usual distance, projecting somewhat more than a centimetre, to leave room for the nose of the patient between them. When the patient applies the eyes to the oculars, the observer placed at the

side may readily see that the two eyes are open, and remain so during the entire examination. A grooved spring in front of each ocular admits of the insertion of a lens when necessary or advisable.

The mechanism of transposition employed is that of André and Bertelé. A plate of thin wood pierced with two lateral holes gives the direct vision; a plate pierced by a single median hole gives the crossed vision of the test-cards. To facilitate the dissociation of the images, these openings are provided with weak prisms. It is impossible for the patient to know whether the test-cards are seen directly or not; the letters are always read in the natural sense. The two wooden plates are fixed perpendicularly one above the other, by one of their margins, and movable around this point of union which serves for axis. It is only necessary to raise or lower with the finger a metallic lever placed on the right side of the box and invisible to the patient, in order to produce the direct or crossed vision of the test-cards. When this lever is raised horizontally the vision of the test-cards is crossed. If the lever is lowered, if it is vertical, the vision of the test-cards is direct.

ON LATENCY IN CEREBRAL TUMOR—A CASE OF RELAPSING NEURITIS.

ANDERSON'S report of a case of relapsing neuritis (*Ophthal. Rev.*, May, 1886) is interesting. It occurred in a girl, aged seventeen, and illustrates the fact that optic neuritis arising from intracranial disease may run, not only its early but its entire course, without obvious affection of vision. Two interesting points arise in the consideration of this case: first, whether the neuritis arising from intracranial tumor necessarily ends in atrophy with more or less visual defect; and, second, whether a transitory, recovering neuritis must be explained, not by the presence of the tumor, but by a meningitis arising independently of a tumor. The patient, when she first came under observation, presented the usual symptoms of an intracranial growth. She recovered under treatment, and remained apparently in perfect health for more than a year; then, without any evident cause, she fell ill exactly as she had done before. She again recovered, and remains still apparently in perfect health; but Anderson believes she is not, and expects further developments in the case. Where the optic nerve has recovered from a neuritis, there is no reason why it should not again become inflamed; and, on the other hand, optic nerves which have undergone simple, non-inflammatory atrophy, may develop well-marked neuritis. In all cases of intracranial disease, it is wise to examine the fundus of the eyes frequently from the beginning to the end.

THE EXCISION OF THE RETROTARSAL FOLDS AND OTHER PROCEDURES FOR THE CURE OF TRACHOMA.

HOTZ (*Arch. of Ophthal.*, xv. 2) does not think that the operation of excision of the retrotarsal folds deserves a place in ophthalmic surgery, for he considers the cure worse than the disease. The retrotarsal folds are inserted between the eyelids and eyeballs, to insure to these organs perfect freedom of motion. Whenever the retrotarsal fold is destroyed, whether by accident or operation, its absence is manifested by a greater or less degree of ptosis, induced by this limitation of motion. Hotz also thinks that the great disposi-

tion to recurrent inflammations of the cornea and conjunctiva, observed in eyes where the retrotarsal folds have been obliterated, is a direct consequence of the continuous traction and tension to which the conjunctiva is subjected during the movements of lids or eyeballs.

In place of this operation, he recommends that the diseased follicles be squeezed and their contents evacuated as follows: The upper eyelid is held everted by the thumb or forefinger of the left hand, while the end of the thumb or forefinger of the right hand is inserted under the everted lid, with the palmar side toward the eyeball. Thus the upper tarsal border and the swollen or infiltrated retrotarsal fold are placed just between the two thumbs or forefingers. If now these thumbs or fingers are pushed toward each other, and at the same time if the thumb or finger of the right hand is made to glide slowly forward from under the trachomatous conjunctival fold, this is subjected to a steady and continuous pressure which will force out the contents of the trachoma follicles. By repeating this manipulation several times along the whole breadth of the eyelid, all the trachoma follicles may be evacuated at one sitting.

On the lower eyelid he uses an old-fashioned iris forceps, with a slight curve and no teeth; with its convex side upon the conjunctiva, the forceps is opened to engage a portion of the trachomatous fold. If now its branches close upon the conjunctiva, and the forceps are gradually moved upward, the enclosed conjunctiva is slowly run through the branches of the forceps and thoroughly squeezed. This squeezing process is very painful, even under cocaine, and an anæsthetic is sometimes necessary. The evacuation of the trachoma follicles is always attended by considerable bleeding. Short applications of cold water always alleviate the pain, and in two or three days the conjunctiva will have recovered from the effects of the squeezing process, and may be then treated with the remedies necessary to complete the cure.

IRRITABLE STRICTURE OF THE URETHRA IN THE MALE, RESULTING FROM MASTURBATION, A CAUSE OF HYPERÆSTHESIA OF THE RETINA.

BEAVER (*Arch. of Ophthalm.*, xv. 2) reports a singular case of this nature. There was disturbance of only a single function of a single extension of the nerve centres—hyperæsthesia of the retina. The impressions which masturbation made upon the visual disorder must have passed harmlessly through the spinal nerve centres to the reflex centres at the base of the brain. Here a corresponding irritation was set up and reflected to the optic centre. The symptoms were first pain, then loss of sight, and a few minutes later faintness, which did not end in full syncope. The amblyopia was not dependent apparently upon disturbance of the inhibitory centres of the heart, which it preceded, but was the immediate effect of the irritation of the hyperæsthetic urethra.

CONTRIBUTION TO THE KNOWLEDGE OF XANTHOPSIA.

THILBERT (*Arch. of Ophthalm.*, xv. 2) reports a case of xanthopsia occurring in a man, of medium size and strongly built, who was subject to epileptic seizures once in six or eight weeks. About twenty-four hours before every attack all objects appear of an intensely yellow color, which condition con-

tinues up to the beginning of the epileptic attack and then passes off. The disturbance of the color sense did not seem to correspond with the "aura," but appeared to be due to separate irritation of the color sense. The true "aura" was experienced just before the fit in the form of an acoustic conception. He usually cried out, "Do you hear the music?" and immediately became insensible. The patient's vision and field were normal, and his refraction was slightly hypermetropic. The fundus always appeared normal before, during, and after the attack. The disturbance of the color sense in this case was evidently central.

THE OCCURRENCE OF MICROÖRGANISMS IN THE CONJUNCTIVAL SAC IN PHLYCTENULAR CONJUNCTIVITIS AND OTHER CONDITIONS OF THE CONJUNCTIVA AND CORNEA.

GIFFORD'S paper is an interesting contribution to our knowledge of bacteriology (*Arch. of Ophthalm.*, xv. 2). While assistant to the Ophthalmic Clinic at Zürich in 1885, he began making cultures from the conjunctival sac and from the skin pustules about the eyes in cases of phlyctenular conjunctivitis. In every case pathogenic cocci were found. All the primary cultures were made on the usual beef-extract peptone agar-agar. This was used in the usual test-tubes, which, after being inoculated, were kept at a temperature of 35°-37° C., at which the cocci grew rapidly at first, but they generally ceased growing in the course of forty-eight hours, unless transferred to fresh tubes.

Gifford found the following species of micrococci in the conjunctival sac :
 1. A coccus growing in the primary cultures in milk-white glistening spots ; on gelatine it also remains white ; pathogenic. 2. At first white, then becoming orange-yellow on both agar and gelatine ; in mass sticky and elastic ; pathogenic. 3. On agar, showing only the slightest tinge of yellow ; on gelatine, showing the same orange-yellow as in the preceding form ; pathogenic. 4. A coccus growing on agar in tenacious masses with a slight tinge of salmon-yellow ; on gelatine this color is more strongly marked ; not pathogenic. 5. Bright lemon-yellow, growing abundantly on both agar and gelatine ; pathogenic. 6. Very large ; very many diplo- and quadrococci, also many specimens of the biscuit form ; light salmon-yellow ; not pathogenic. 7. Milk-white ; occurring both individually and in short chains.

All the cocci obtained from the conjunctival sac occur chiefly as diplococci, but also singly and as quadrococci, and in short chains of three or four members. Noteworthy in all the cultures was the almost entire absence of bacteric forms other than micrococci. A coccus is pathogenic when, on inoculation into a cornea, it causes a severe keratitis with marked iritis and exudation into the anterior chamber. The process extends for two or three days, then becomes limited, and in the course of a month leaves merely a dense opacity behind. Introduced into the vitreous the pathogenic cocci produce a severe inflammation, which converts the greater part of the vitreous into a mass of cheesy pus, and may produce panophthalmitis. The non-pathogenic cocci, on the contrary, produce in the cornea only a small infiltration, and the iris is practically not involved. In the vitreous they cause a slight inflammation which soon becomes self-limited, leaving the greater part entirely clear. All this, of course, *proves* nothing as regards the etiology of conjunctivitis phlyctenulosa. It makes it somewhat probable, however,

that the first three species of cocci mentioned above bear some causal relation to the disease.

Gifford cites a number of cases to show the unreliability of washing out the conjunctival sac with sublimate solutions of 1:5000. In nearly all his cases the inoculations were made after the eyes had been bandaged antiseptically for one or more days. The solutions of mercuric bichloride, as ordinarily used, are by no means efficacious in disinfecting the normal conjunctiva, either because of the difficulty of reaching all the corners of the sac or from its property of causing albuminous precipitates, by which the solution is weakened and the fungi perhaps directly protected.

It seems strange to some, inasmuch as pathogenic microorganisms occur in many if not all normal eyes, that more operated eyes are not destroyed, and the reason probably is that infection of an incised wound is by no means so constant an accident as has been believed. The conditions in incised wounds of the cornea are not favorable for the occurrence of an infection, since the edges of the opening either cohere at once or are kept clean by the continually escaping aqueous. But the situation is quite different when, in any way, a colony of cocci is carried deeply into the anterior chamber or vitreous. The better results which have positively been obtained in ophthalmic surgery by the use of antiseptics are undoubtedly due partly to the cleaner hands and instruments used, and partly to the cleansing of the surface of the eyeball, which, while not preventing cocci from remaining in the depths of the conjunctival sac, tend to prevent them from being rubbed into the wound surface or carried into the anterior chamber with the knife or forceps. Finally, these results show that in testing the antiseptics to be used in ophthalmic surgery, we must try them on the fungi as they exist in the conjunctival sac.

SUBCONJUNCTIVAL LIPOMA IN CONNECTION WITH ICHTHYOSIS HYSTRIX.

BÖGEL'S cases (*Archiv f. Ophthalm.*, xxxii. 1) are interesting. Both showed the same anatomical structure, of a dermal character, especially next the epithelium and the cutaneous connective tissue layers, in which are numerous well-marked nerve trunks and vessels, with an abundant fatty and glandular development. Bögel thinks that the existence of pure lipomata of the conjunctiva is doubtful, and he describes the subconjunctival lipomata as teratoid tumors, divided into two classes: 1st. Those which appear under the usual form of dermoid growths with all their attributes; 2d. Those in which are seen, besides the epithelium and cutaneous connective tissue, only hyperplastic deposits of fat, nerves, and acino-tubular glands. All these tumors of the conjunctiva are congenital. These teratoid conjunctival tumors, occurring at the external canthus, are to be arranged in the same category with those which occur along the margin of the cornea, which are always pure dermoids.

THE EXTRACTION OF INTRAOCULAR CYSTICERCUS.

LEBER here reports fourteen additional cases of intraocular cysticercus removed by operation (*Archiv f. Ophthalm.*, xxxii. 1). He describes his method of operating as follows: The conjunctival flap, made for the purpose of covering the scleral wound, is so made that the conjunctival wound may lie as far as possible from the wound in the sclera. The sclera is then opened either

with a narrow knife or with an oblique lance knife, and the wound is sometimes lengthened by the scissors. Strict antiseptic precautions are observed throughout the entire operation. The wound in the sclera is not closed, but the conjunctival wound is carefully closed with fine silk sutures. The place chosen for the operation depends, of course, upon the location of the cysticercus bladder.

THE THERAPEUTIC VALUE OF LACERATION OF THE EXTERNAL NASAL NERVE.

LAGRANGE (*Archives d'Ophthal.*, May-June, 1886) draws the following conclusions from his somewhat prolonged studies upon the effects of Badal's operation: 1. In neuralgia of the ophthalmic branch of the nerve of Willis, laceration of the nasal nerve gives results as good as those following laceration of the frontal nerve. 2. In acute glaucoma, the laceration of the nasal nerve almost always lowers the tension, causes a cessation of the pain, and often cures the case. In chronic glaucoma its effects are uncertain, and the definite results generally unsatisfactory. 3. In acute ciliary pain (as in traumatic irido-cyclitis, etc.) the laceration of the nasal nerve is an excellent operation, and sometimes does away with the necessity of an enucleation. In chronic ciliary neuralgia its results, though less certain, are sufficiently encouraging to induce its performance in all cases.

STUDIES ON THE EXTRACTION OF CATARACT.

BETTREMIEX formulates the results of his studies on the methods of extraction of cataract (*Archives d'Ophthal.*, May-June, 1886) in the following conclusions: 1. The only classic method for the operation of senile cataract, applicable to the majority of cases, is the simple method of Daviel. 2. The extraction combined with iridectomy answers a certain number of special indications. 3. In the present state of ophthalmic surgery, iridectomy is indicated, 1st, a certain time before the extraction, as preparatory, in cases of cataracts which mature very slowly, and for certain complicated cataracts; 2d, immediately before the extraction, when the iris resists the exit of the nucleus (primary iridectomy); 3d, immediately after the extraction, whenever the iris has been bruised or has prolapsed; 4th, a certain time after the extraction, when the iris has become imprisoned in the wound.

OTOLOGY.

UNDER THE CHARGE OF

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ACUTE AND CHRONIC PURULENT INFLAMMATIONS OF THE MIDDLE EAR TRACT AND THEIR COMPLICATIONS.

DR. SAMUEL SEXTON, of New York, at the recent meeting of the American Otological Society, July 20, 1886, read a paper with the above title. It was based

on the records of over two thousand cases, which were divisible into three classes, viz., acute purulent inflammation of the middle ear, acute catarrhal inflammation of the middle ear, and chronic purulent inflammation. Of this series, one hundred and thirty-one were grave, and twelve died. In no disease is a knowledge of regional anatomy more important than in that of the middle ear. Brain symptoms, such as headache, vertigo, pain, delirium, nausea, and vomiting may occur in consequence of middle ear disease, without lesion of the cerebral structure. The prognosis of purulent inflammation of the middle ear is favorable when suitable treatment is adopted, both as regards hearing and life. Out of twenty thousand cases of ear disease in the writer's practice, where the patient had been seen at the beginning of the attack, no fatal case had occurred. In regard to treatment, so far as drainage is concerned, incision of the drum-head is preferable. Trephining the mastoid has been recommended by some authorities, but Dr. Sexton maintains that the indications which have been regarded as calling for the operation with the mastoid trephine are insufficient. From his experience, he is led to believe that drainage can be best maintained through the natural channel.

A NEW OPERATION FOR THE RADICAL CURE OF CHRONIC PURULENT INFLAMMATION OF THE MIDDLE EAR TRACT.

Since describing a form of chronic purulent inflammation of the attic, at the meeting of the American Otological Society in 1885, DR. SEXTON has resorted to an operation with success in such cases, and in other cases of chronic purulent disease of the middle ear. It is found that in the greater number of these cases the remaining portion of the conducting mechanism no longer serves to aid in the transmission of sound, but acts rather as an obstruction to drainage. The author has observed that in a number of instances in which the transmitting mechanism had been lost a spontaneous cure followed, and it occurred to him that the curative action of nature might be imitated with advantage. When drainage from the attic and antrum is interrupted, a cure can only be assured by an operation permanently clearing the passage outward from the tympanum.

The operation about to be described was tried last year in a case of long-standing otorrhœa, due to chronic purulent inflammation of the attic. Since then the operation has been fully performed in several cases. The first step of the procedure is to separate the membrana flaccida from the edge of the auditory plate, and to remove any portion of the membrana vibrans adherent to the auditory ring. If the malleus and incus remain *in situ*, it is well to divide the tendon of the tensor tympani muscle when present, where it leaves the handle just behind the short process and below the chorda tympani.

The chorda tympani, when remaining, is then divided where it enters the tympanum at the pyramid, and also at its exit into the canal of Huguiet. The long process of the malleus, being also received into the glenoid fissure by means of this short oblique canal, along with the chorda, may be more or less detached at the same time. The detached tissues and ossicles should now be removed with the forceps. It will frequently be found that the incus, though displaced, still remains. It may be removed with the attic scraper, which is to be introduced from below and passed up along the inner wall of the tympanum, when the distal end may be carried over the incus or malleus,

if the latter bone remains, and by traction the ossicles can be detached. Polypoid masses, granulation tissue, and the products of inflammation may now be removed with the cutting curette or cutting forceps, and the parts dressed with a four per cent. solution of cocaine. There is usually free bleeding during the operation, often sufficient to protract it and increase its difficulties. In order to avoid the danger of using an ordinary lamp in connection with the administration of ether, an electric light has been used.

The effect of injury or destruction of the membrana tympani nearly always manifests itself in some way, but has never been a matter of serious import in Dr. Sexton's experience. The sense of taste may be temporarily affected, but finally becomes normal. The drum cavity should be kept well cleaned, and light dressings of boric acid applied until healing takes place. Salicylic acid powder may be applied as freely as it can be borne. In some cases irritation at first, is succeeded by a tolerance. It may then be kept up until the parts cease to discharge. In the cure resulting from this treatment, a dermic transformation of the tympanum takes place; but mucus may at times gain admission from the Eustachian tube. Where the incudo-stapedial connection remains, the operation may still be performed, unless a considerable portion of the membrana vibrans is present.

SUPPURATION OF THE TYMPANIC CAVITY TREATED WITH INSTILLATIONS OF CORROSIVE SUBLIMATE SOLUTIONS.

DR. DUJARDIN, of Havre, has been induced to try solutions of bichloride of mercury, on account of their well-known antiseptic power in suppuration of the middle ear (*Revue Mensuelle de Laryngologie, d'otologie, etc.*, June, 1886). The first trial of this agent was made in a case of suppuration of the middle ear in a tuberculous patient. The result was very favorable, and he has employed this antiseptic in all cases of otorrhœa he has since observed, four in all. Having observed that in some cases the injections or instillations through the external auditory canal were inefficacious, the author resorted to injections of the sublimate solutions, through the Eustachian tube, after the method of Gellé (1885). This method is best adapted to cases with small perforations in the membrana tympani. With large perforations, instillations by the auditory canal will reach the drum cavity. Dr. Dujardin is not an aurist, and his experience in a procedure of rather doubtful expediency or necessity is based on only four cases. Otorrhœa can be cured in other ways, and therefore it is not required of the aurist to subject his patient to the risk of sublimate poisoning, on the purely theoretic grounds assumed by the author under consideration.

TREPHINING FOR EVACUATION OF INTRACRANIAL ABSCESS OCCURRING IN CONNECTION WITH SUPPURATIONS IN THE EAR.

MR. J. W. HULKE reports (*Lancet*, July 3, 1886) three cases of intracranial abscess, from aural disease, in which trephining was practised. The first case was of chronic otorrhœa with caries of the petrous bone, and abscess in the cerebellum, erroneously supposed to be in the temporo-sphenoidal bone, and in which the lobe was punctured. The patient was a man, aged forty-five, who complained of severe pain in the left half of his head, most intense in the occi-

put, radiating over the temporal and frontal regions. Immediately above the pinna of the left ear there was a spot extremely tender on pressure, which proved a misleading symptom in the choice of the point for trephining. There was also tenderness on pressure behind and above the mastoid. There was history of chronic otorrhœa on both sides since childhood. About three weeks previous to his admission to the hospital, he began to have severe aching in the left ear, and a few days thereafter pain in the back of his head. He was unable to sleep, and the discharge from the ear was tinged with blood. He grew rapidly worse and became unconscious to external impressions. He swallowed with difficulty, and had lost control of his sphincters. Intracranial abscess was diagnosticated, and in the absence of other localizing symptoms the extreme tenderness above the pinna was taken as an indication that the abscess was probably above the level of the attachment of the tentorium in the middle fossa. The squamous bone was therefore perforated with a small trephine, the pin of which was set at a distance of one centimetre above the external auditory meatus. The dura mater was divided, and a blunt-ended director was passed through the opening toward the tegmen tympani, until it struck the upper surface of the petrous bone. No pus escaped. It was evident that the operation had failed of its purpose. Death occurred in about twenty-four hours after the operation.

The post-mortem revealed, in the left cerebellar hemisphere, about the centre of its anterior border, where this is in contact with the petrous part of the temporal bone, an abscess the size of a walnut, containing thick, greenish pus. This was in contact with a small aperture in the dura mater, through which pus had burrowed from a carious portion of the temporal bone in connection with disease of the internal ear. The left cerebellar hemisphere was considerably swollen, and had evidently compressed the pons and medulla.

Mr. Hulke then remarks, very justly, that "the post-mortem inspection left no doubt in my mind that this abscess could have been tapped by trephining the occipital bone, below the level of the attachment of the tentorium." He regrets that this was not done immediately upon the failure of the puncture of the temporo-sphenoidal lobe. Whilst the operation failed to accomplish the purpose for which it was undertaken, it is valuable as tending to show the relatively slight dangers attending it.

The second case was one of chronic otorrhœa, polypus in the auditory canal, carious perforation of the tegmen tympani, and abscess in the temporo-sphenoidal lobe. The patient was a girl, nineteen years old. She complained of headache, most intense at the vertex and in the right side of her head. Her right ear was absolutely deaf. The orifice of the meatus externus was full of fetid pus, on removing which a polypus became apparent. At the bottom of the meatus bare bone was felt with a probe. There was great tenderness over the mastoid, and, in a less degree, over other parts of the right side of the head. The temperature in the right axilla was 98°; in the left, 97.8°. Pulse 50, small, and slightly irregular. Her left ear was also deaf, and had once been the seat of chronic otorrhœa. Four weeks before coming to the hospital she had fallen, striking her head against a table, but not cutting the scalp. She appeared dazed and stupid for a day or two after. During the subsequent three weeks she had complained on and off of headache, and she had occasionally vomited. A week before her admission the headache

became more intense and the vomiting more frequent. It was decided that an intracranial abscess existed, and trephining was determined upon.

The extreme tenderness of the mastoid, and the fact that pent-up pus in this cavity sometimes gives rise to symptoms closely resembling those of intracranial abscess, suggested the propriety of first exploring this process. This was done, but no pus was found. Two days later, her condition becoming graver, and influenced by the history, and by the recollection of the position of the abscess in the preceding case, it was decided to explore for abscess in the cerebellum. The spot chosen for perforating the bone was about two centimetres behind and inward from the mastoid process, the crown of the trephine encroaching on the inferior curved line. This spot was chosen as being sufficiently beneath the lowest level of the horizontal part of the lateral sinus, and also sufficiently removed inward from the descending part of the sinus. The dependent position of the spot was also thought advantageous for drainage of the abscess, if found. The extremely thin bone in this case was easily perforated with a gouge. A grooved blunt director was passed through the opening in the direction of the internal auditory canal, until it touched the posterior surface of the petrous bone, and no pus escaping, the director was passed twice again, in directions approximately parallel to the surface of the petrous bone, at slightly increasing distances from this. It was too evident that the operation had failed to discover pus. It was also particularly noted that no change in the pulse or respiration had occurred during the operation.

The next day, March 27, temp. 97.2° , pulse 54. She vomited frequently in the course of the evening, and was dozing all night, though not asleep. She still complained of severe headache, but did not refer it to any one part of the head. 28th: Temp. 97.4° ; pulse 56. No vomiting; desire for food; less headache. 29th: Temp. 97.2° ; pulse 56. At 8 P. M., ten hours later, temp. 97.4° ; pulse 50. 31st: 10 A. M., temp. 97.4° ; pulse 56; respiration 16. April 1: 10 A. M., temp. 99.4° ; pulse 54, small, irregular; respiration 19; semi-comatose; the right pupil dilated, the left contracted; muscular movement of right arm much better than that of left, the latter being distinctly weaker; epigastric, abdominal, and plantar reflexes normal; no ankle clonus. During this examination the face became flushed, and breathing slightly stertorous. The left forearm was convulsively pronated, and both hands and feet were spastically flexed. This attack passed off quickly, but was repeated four times in the course of the next hour, and whilst the wounds were being dressed. At midday paresis of the left arm was noted, and she was no longer aroused, even by being loudly spoken to. Reluctant to abandon the case without further effort for relief, at 3.30 P. M. the squamosa was trephined above the external auditory meatus, the dura mater divided, and a grooved director passed in the direction of the tegmen tympani: about half an ounce of thick, fetid, dark, greenish-yellow pus escaped. Shortly after this operation the pulse rose to 100, and an hour later to 128. At 7 P. M., four hours after the operation, the temperature was 100.2° ; at 9.30 P. M., pulse 124, respiration 22, patient restless and insensible; the pupils equally dilated; there were slight, transient convulsions affecting the whole body. Death occurred at 5 A. M. on the 2d of April.

The post-mortem examination revealed no meningitis, except about the centre of the right middle temporo-sphenoidal convolutions, where, over an

area about the size of a shilling, the brain was adherent to the parietal layer of the arachnoid. It was also seen that the upper surface of the right petrous bone, close to the junction with the squama, showed several perforations, through which pus welled from the bone beneath into the cranial cavity. There was another perforation at the junction of the squama and the petrous bone, in the posterior fossa of the skull, where the lateral sinus grooves the latter. This had caused thrombosis of the sinus and complete obstruction of its lumen for the distance of half an inch. There was no sign of inflammation in the neighborhood of the cerebellar wound, nor was there any abscess in the cerebellum. The abscess in the temporo-sphenoidal lobe was a well-defined cavity, the size of a walnut.

The third case was one of chronic otorrhœa, with abscess in the cerebellum, evacuated by trephining the occipital bone. The patient was a lady, aged forty-five, seen in private practice. She had long been subject to a purulent discharge from the right ear. When seen by Mr. Hulke she was comatose; her cheeks and lips were bluish; and her breathing heavy, but not stertorous. Pulse slow, and temperature low. The illness began about sixteen days previous to the consultation. She then began to complain of aching in the right ear and right side of the head, with stiffness and uneasiness in the nape. These symptoms continued until four days before the consultation, when drowsiness was noticed, which increased to the time of the consultation, when it had become coma.

From the depth of the coma and the absence of left hemiplegia, Mr. Hulke was led to the diagnosis of abscess of the cerebellum, as these symptoms were unfavorable to the supposition of the existence of abscess in the temporo-sphenoidal lobe. The operation of trephining the occipital bone was then performed in a manner similar to that in Case 2. The immediate effects of opening the abscess were striking. The pulse was soon noted as 72; the breathing became easy; the cyanosis of the face disappeared; and the coma was less deep. Consciousness did not return, however, and the patient died in the afternoon of the day of the operation.

The concluding remarks of the author are as follows: "If it be objected that, as they were all three fatal, they fail to justify the treatment, a trial of which I advocate, I may fairly rejoin that this simply shows the powerlessness of trephining to relieve at the very late stage at which it was practised. In the future we must strive at perfecting the early diagnosis of abscess; and this once made, we must boldly and without hesitation apply the same general principles of surgery which govern the treatment of abscess in any less noble part of the body." It is perhaps a matter of regret that no aurist saw these cases, and we are therefore without any knowledge of the condition of the tympanic cavities in these subjects. In the opinion of the reporter, in cases like these the aurist and the general surgeon would do well to work together, supplementing each other's deficiencies in knowledge and diagnosis.

CERTAIN TECHNICAL DETAILS RELATING TO OPERATIONS ON THE MASTOID.

DR. A. H. BUCK presented a paper with the above title before the American Otological Society, July 20, 1886. He referred to the objections which had been made to the drill, in the operation of trephining the mastoid. It

had been stated that there is danger of plunging the drill into the lateral sinus, or even into the brain. He had, however, found no such tendency on the part of the drill. The size of the opening can be controlled by the size of the drill. He uses a drill one-fourth of an inch in diameter, until the antrum is reached, and finishes the operation with a smaller drill. This gives sufficient opening for drainage, but if a large sequestrum is present, a larger opening must be made. Pyæmia and septic fever are rare after the use of the drill. With a knowledge of the parts to be operated upon, the drill can be used with perfect safety. It can be guided perfectly by resting the fingers on the bone. The conical shape of the drill enables the operator to tell when its point has entered a cavity.

The objections to the use of a chisel were then taken up. Dr. Buck claims, very justly, in our opinion, that when the chisel is used, the wound in the adjacent parts must be larger than when the drill is used, and the opening in the bone is more extensive, thus leading to a depressed cicatrix. More time is required in using the chisel, and it is not free from danger. These objections would be trifling if the results of the operation performed with a chisel were more satisfactory than those done with the drill. But a study of the statistics of both methods shows nothing to warrant the statement that the employment of gouges and chisels is preferable to the use of the drill in establishing openings into the mastoid.

In operating with the drill, after making an opening, Dr. Buck cuts out a little canal for the escape of the discharges, for the opening made by the drill is covered by the flap when it comes into position. For the first four or five days after the operation the wound is irrigated with a bichloride solution, 1 to 2000. Dr. Buck, in his earlier operations, was accustomed to applying the drill a short distance in front of the vertical line, through the point of the mastoid; but now he makes a straight vertical incision, three inches long. By this means the mastoid is exposed where it curves into the meatus. The drill is then applied to the first flat surface. The only difficulty is to establish the final communication between the canal and the antrum.

In the discussion which followed this paper, Dr. J. Orne Green, of Boston, advocated the use of the drill; while it was opposed by Drs. H. Knapp, Noyes, and J. A. Andrews, of New York. Dr. Gruening uses the drill in acute cases, but the chisel in chronic cases demanding a large opening.

It will be highly advantageous, in the opinion of your reporter, when the Society of aurists will discuss rather *when* to use any form of perforators for the mastoid, rather than *what* to use. For a long time it has been very clear that the mastoid is operated upon too late; still, no one is able to point out the proper, safe, and early time to do it.

Dr. Knapp's case of "Fatal Termination of a Case of Sclerosing Mastoiditis, after Chiselling the Bone" (American Otological Society, July 20, 1886) shows the usual futility of such operations in chronic cases, which already present a free vent for pus through the perforated membrane and the external auditory meatus.

In Dr. Pomeroy's case of "Abscess of the Mastoid Cells where the Chief Indication for Operation was Elevation of Temperature," there was at least an endeavor to offer an indication to guide the surgeon in his decision to operate, though it is difficult to see how the presence of only "four to six

drops of pus" could have caused the elevation of temperature upon which the indication for opening the mastoid was based, especially as the membrana was already perforated by acute inflammation. It should have been borne in mind that the acute otitis could cause the fluctuations in temperature, and would also render the presence of serious mastoid disease highly improbable. The patient recovered from the disease and the operation, as might have been expected, as there was no chronic disease in the temporal bone, and hence no nidus of pyæmic poisoning, and the operation in itself, if done by one of experience, is of no grave moment.

But this very fact of the absence of great danger in the operation itself may lead to a reaction in favor of the too frequent or too hasty recurrence to it. The experience with this operation in the time of Baron von Berger should not be forgotten. It was considered so useful and so trivial that it was resorted to for the cure of tinnitus aurium in the person of von Berger himself. The opening in the mastoid was followed by injections into the cavity. Fever and delirium set in, and von Berger died on the eleventh day, of purulent meningitis.

EPILEPTIFORM ATTACKS CAUSED BY SIMPLE CHRONIC NON-SUPPURATIVE OTITIS MEDIA.

DR. NOQUET, of Lisle, in a paper with the above title, considers the well-known phenomena of aural vertigo, with simply another name. The sketch of the disease is well presented, abundant reference being made to French authors, but there is nothing new in the article. His concluding remarks, as they apply so well to the important disease known as aural vertigo, bear some repetition here. It is, indeed, a most distressing malady, as in most cases the sufferer is pronounced to be an epileptic, he loses his situation, or is hindered in his private affairs on account of his supposed attacks of epilepsy. In reality, his malady is due to an ear disease, of which he is ignorant, and to which it often happens that nothing will especially direct his attention. The author, therefore, insists upon the importance of examining the ears of all patients suffering with vertigo, or with epileptiform attacks, even if the subjects themselves are unconscious of any unfavorable aural symptom.

TINNITUS AURIUM IN AFFECTIONS OF THE STOMACH.

DR. E. MÉNIÈRE has given the results of his observations upon the effects of gastric diseases on the ears, as indicated by the production of tinnitus aurium (*Revue Mensuelle de Laryngologie, d'otologie*, etc., Juin, 1886). He begins by the announcement of the common experience of aurists, that a large number of those suffering from tinnitus are entirely free from any aural conditions to account for this distressing symptom. Deafness may, indeed, be present in a patient suffering from tinnitus; due, however, to a stomachic disorder. He refers to the theory of Woakes, of London, that the tinnitus in such cases is due to an affection of the internal ear. This part of the ear being supplied exclusively by the vertebral artery and its branches, which are closely connected with the inferior cervical ganglion, and this ganglion being supplied with a branch from the pneumogastric nerves, any disturbance in the latter is reflected to the vertebral artery, its calibre is increased, and passive congestion of the labyrinth, especially of the cochlea, ensues.

The conclusions of Ménière are as follows:

It is possible to become deaf through disease of the stomach.

Otologists should always seek most carefully for any possible connection between tinnitus aurium and disease of the digestive tract.

The diagnosis is rendered more exact by the absence of disease of the external or middle ear.

The noises may arise even before marked symptoms of stomachic disease. Generally, however, they appear near the second or third year of chronic gastric derangement, or even later.

According to Ménière's observations, the noises generally affect only one ear.

The deafness is variable. Sometimes it is profound, and then it is incurable. Diminution or increase in the noises follows closely, in some cases, an increase or decrease in the dyspepsia.

Treatment, as a rule, gives only moderately good results. Nevertheless, static electricity has proven of value, in Ménière's hands, in the acute stages of the noise (he does not state how it is to be applied). The most rational indication is most carefully to guard the stomach, the point of the origin of the malady. Bromide of potassium in large doses, if endured by the patient, is of use in some cases. Finally, it is to be feared that the lesions in the internal ear, though slight, are constant enough to cause persistence of the noises to a greater or less degree.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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TREATMENT OF DIPHTHERIA BY FUMIGATIONS OF COAL TAR AND TURPENTINE.

M. CADET DE GASSICOURT (*Union Médicale*, 20 Mai, 1886, No. 68, p. 828), referring to his report last year of the poor results obtained in the Hôpital Trousseau, reports his more recent experience. Experiments upon false membranes referred to the direct action of these vapors in a capsule for several hours, or even an entire day, showed that the effects were *nil*, the membranes being simply colored black. In twelve patients in the stage of continuous stridor, not one exhibited the slightest amelioration, and all twelve had to be submitted to operation. The thick, black smoke augmented the cough and the paroxysms of suffocation. In the sole case benefited, the disease was found the next day to have been stridulous laryngitis. In a quarter of an hour the canula of a tracheotomized infant became so obstructed with the carbon that the outer tube had to be removed several times as well as the inner tube. This child died with pseudo-membranous bronchitis, and the carbonaceous

dust was found as far as the ultimate bronchial ramifications. In some experiments by Dr. Frémont on tracheotomized rabbits and guinea-pigs traces of carbon were found not only in the bronchi but in the subpleural connective tissue, in the alveoli, and in the foci of broncho-pneumonia which had been developed around the carbonaceous masses.

THE NASAL DOUCHE.

DR. E. J. MOURE, of Bordeaux (*Rev. mens. de lar.*, etc., Juillet, 1886, p. 415), describes and illustrates a modification of the nozzle, intended to prevent patients from injuring themselves by directing the fluid upward. An olive-shaped extremity of the nozzle is bent nearly to a right angle with the shank, so as to occupy the floor of the nasal passage when introduced. A nozzle constructed on this principle, but not quite so angular, devised several years ago by Dr. Lefferts, of New York, in connection with a spray producer, has long been widely used in America.

THE RELATION OF DISEASED NASAL MUCOUS MEMBRANE TO ASTHMA.

The subject has been copiously discussed in recent numbers of the *Deutsche medicinische Wochenschrift*. M. BRESGEN reiterates his belief that all asthmatics suffer with some degree of chronic catarrh of the upper air-passages, especially those of the nose; and that many of the cases, if not, indeed, all of them, are curable by rhinochirurgical treatment. He still maintains that the main seat of the malady is almost exclusively situated in the swollen mucous membrane of the inferior turbinated body, and in the anterior portion of the middle turbinated body, the turgescence of which structures he considers altogether as abnormal. Hence topical surgical treatment which destroys this tissue will cure the asthma, or give great relief. Electrocauterization is preferred in freely accessible localities, and cauterization by chromic acid in those less accessible, cocaine being applied first to prevent pain or to mitigate it. Failure in the treatment is attributed to lack of skill in the manipulation, or want of thoroughness in its prosecution. Distrust in these remedial measures is believed to indicate lack of knowledge in discriminating pathological from normal tissue.

W. LUBLINSKI (*Idem*, Nos. 23, 24, 1886) summarizes the literature chronologically, and combats the views of Hack as to the dependence of the paroxysms on the erectile tissue of the turbinate bodies considered as a connecting link between irritations in the nasal passages and nervous excitation outside, the entire chain being controllable by operative destruction of this link. With other observers, he attributes the phenomena primarily to irritation of the terminal endings of the fifth nerve in the nasal passages, or of the endings of the olfactory nerve, as may be. He believes that there is always, in asthma, some diminution in the calibre of the bronchi and some spasm of the diaphragm; and that the nervous paths for reflex action are abnormal in all instances of neuroses of nasal origin. Many of his patients were hysterical, poorly nourished, or physically depressed; females predominating in public practice, and most of the males having suffered reverses of fortune; while in the more equable distribution of the sexes in private practice most of the males were hard intellectual workers without sufficient recreation. Lublinski has seen but seven instances of asthma in seventy-nine cases of nasal polyp. Varicose

thickening of the turbinates excites asthma, and doughy swellings of the septal mucous membrane is the next most frequent cause. Posterior thickenings of the turbinates produce rather a pseudo-asthmatic dyspnoea by occlusion of the nasal passages while the subject is in the horizontal position; a condition relieved temporarily by breathing through the mouth, and permanently by destruction of the tissue. While admitting the importance of topical treatment, Lublinski insists on proper treatment of the constitutional condition, and warns against the abuse of the electric cautery, enumerating a number of untoward sequelæ. During the past three and a half years Lublinski found nasal disease in 143 cases of asthma; hyperplastic rhinitis in 53; hypertrophy and granular enlargements of the lower turbinate body in 21; of the middle body in 11; atrophic rhinitis in 7; polypi in 7; deviations and exostoses of the septum in 9; hypertrophy of the tonsil in 5; various pharyngeal affections in 28. Of the 143 cases, 27 were cured, and 13 improved; 53 per cent. having become unfavorable subjects by reason of alterations in the lungs. Immediately good results were produced only in the cases with polyp. The remaining cases require careful after-treatment, constitutional and topical. Internal medication, previously useless, was often found useful after operation, reference being made to the administration of iodine and nerve tonics.

DR. BÖCKER (*Idem*, Nos. 26, 27, 1886) likewise summarizes the special literature of his theme; he contests the views promulgated by Hack, presenting in his arguments a number similar to some of those of Lublinski. He calls attention to the observations of Johann Müller, who found that the system of respiratory nerves can be excited to convulsive action by local irritation in all parts of the body covered with mucous membrane. Far from considering turgescence of the turbinate cavernous mucous membrane as abnormal, he regards it as a salutary physiological process to prevent access of irritants from without. He limits the designation nervous asthma to cases in which, without perceptible change in the lung tissue, in the brain, or in the track of the pneumogastric, a sudden expiratory dyspnoea occurs associated with a spasm of the diaphragm and of the bronchial musculature. But while no doubt is felt as to a connection between the nose and asthma, the question is put as to how far the asthma is to be attributed to nasal reflex, and how far to an alteration in the chemic interchanges of respiration. Not only do nervous and neurasthenic individuals get asthma from irritating the olfactory ending by the emanations from violets, roses, ipecacuanha, and perfumes, but psychical influences may be operative, as in John Mackenzie's patient, who got asthma from an artificial rose, and in those in whom the paroxysms are excited by extinguishing their night lamps. Such idiosyncrasies can often be relegated to an exalted reflex irritability. Attacks at night being probable, the darkness in its mental association with night excites the paroxysm. He attributes to mechanical causes many examples of what has been explained as reflexes; the nasal disorders being sometimes coincidental, and sometimes a mere favoring condition. Even the disappearance of asthma after operations within the nose is no proof of the reflex character of the asthma. A large majority of the patients with asthma have no intranasal lesions, although slight deflections and prominences of the septum, slight congestions and relaxations of isolated portions of the mucous membrane, may be found in every individual. Relationship between asthma and pathological conditions

of the nose, therefore, must not be taken for granted, but must be substantiated. Operations are requisite in all conditions interfering with due respiration, such as polyps, tumefactions, marked protuberances, cavernous and papillary tumors; but cauterization, especially by burning, is to be avoided in desiccative catarrh. Catarrhal conditions are to be combated by the customary measures, but the chief reliance is always to be placed upon treatment of the constitutional condition. Böcker has seen but nine instances of true asthma in three hundred and ten cases of polypi upon which he had operated, and these nine patients remained relieved until recurrent polypi reproduced asthmatic paroxysms. Absolute cure could not be claimed in any of them, either because the patients had had to submit to operation several times, or because the periods after operation were too short to justify positive conclusions. The periods from which these cases have been reckoned date from 1877. Some of the patients remained relieved for several years. Böcker believes that cures of cases have been heralded too soon. Remissions and subsidences, sometimes years in duration, occur without operation, and then paroxysms suddenly recur with their old severity. In the cases of hay fever treated by electric cautery, an absolute cure did not ensue in a single instance; while better results followed in the cases treated with insufflations of quinine sulphate, and the insertion of pervious wads of cotton.

INTRANASAL DISEASE AND EXOPHTHALMIC GOITRE.

PROF. HACK, of Freiberg, records (*Deutsche med. Woch.*, 1886, No. 25) an example of exophthalmos reduced by cauterization of pronounced hyperplasia of the erectile tissue of the mucous membrane of the lower turbinated bones. The nervous cardiac palpitation ceased, too, and the enlarged thyroid gland became smaller and softer. Hack attributes the disease in his case to permanent irritation of certain peripheric terminal apparatus of the sympathetic expanded in the erectile tissue of the nasal passages. It thus presents an analogy with the large series of reflex neuroses to which for several years Hack has been calling attention, as excited by intranasal disease.

HAY FEVER.

In a contribution to the study of hay fever, so-called (*Medical News*, July 17, 1886, p. 59), DR. BEVERLY ROBINSON, of New York, takes a modest but decided stand against the tendency to attribute all paroxysms of this disease to obstructed conditions of the nasal passages, and he points his argument with a few illustrative examples from his own practice. While acknowledging the propriety of topical treatment by electric cauterization of hypertrophied intranasal soft tissue in cases of complete and very great occlusion, he reiterates his belief that in less aggravated forms of obstruction almost equally good results may be secured by using pure carbolic acid or chromic acid. Finally, he recognizes the importance of treating defective constitutional conditions, and expresses the opinion that the direct influence of morbid intranasal conditions cannot be correctly estimated until the influence of existing systemic disorders has been eliminated in this manner or in some other.

TUBERCULOSIS OF THE LARYNX.

PROF. MASSEI, of Naples, recognizes (*Rev. men. de Lar.*, etc., June, 1886) several forms of tuberculosis of the larynx: 1, ulcerative; 2, arytenoidal perichondritis; 3, infiltration of the vocal bands; 4, nodular foci of the vocal bands; 5, vegetant polypoid. He finds that applications of iodoform in ether almost always give better anæsthetic results than cocaine, the effects of which, though prompt, are more evanescent. He recommends that the use of iodoform or of lactic acid be preceded by sprays of corrosive sublimate, 1:1000, as productive of more rapid results.

LACTIC ACID AS A CURATIVE AGENT IN TUBERCULOUS ULCERATIONS OF THE LARYNX.

DR. HERING, of Warsaw (*Idem*, July, 1886), summarizes the literature of the subject, and analyzes a table of twenty-two cases in his own practice, with the result following: Complete cicatrization with notable amelioration of the lungs and general condition in 2 cases; cicatrization without amelioration of general condition in 2 cases; partial cicatrization, but recurrence with aggravation, owing to pulmonary tuberculosis and fever, in 2 cases; amelioration of the aspect of the ulceration in 3 cases; amelioration of deglutition in 4 cases; death in 2 cases. From a study of the table, it appears that isolated ulcerations in the epiglottis and vocal bands are most amenable to cicatrization under lactic acid. Ulcerations in the ventricular bands and in the posterior portion of the larynx are much less successfully treated. An absence of cases of pyriform swellings is to be noted in the table. In cases of infiltration it is recommended to precede the treatment by deep incisions after the method of Schmidt. Treatment by incision, it may be interpolated, was recommended by Cutter, then of Boston, years before it was advocated by Schmidt. For details as to method of application, general treatment, and special recommendations, reference must be made to the original.

TUBERCULOUS TUMORS OF THE LARYNX.

DR. PERCY KIDD summarizes (*St. Bartholomew's Hospital Reports*, London, 1885, xxi. p. 37) 9 cases—2 reported by Mackenzie, of Baltimore, 3 by Schnitzler, and 4 by himself, as follows: In 3 cases there was a single tumor, in 2 cases there were 2 tumors, in the remaining 3 cases they were described as numerous. In every case their surface was smooth and their shape rounded. Their size varied from that of a pea to a hazelnut or small cherry. In 5 cases they were unaccompanied by ulceration. In 1 case the development of the tumor was followed by ulceration after some time, and in 3 instances they were associated with ulceration when first observed. Their situation was as follows: Ventricles in 3 cases; whole upper part of larynx in 1 case; interarytenoid fold in 2 cases; aryepiglottic fold in 1 case; membranous part of trachea in two cases. Probably they may originate in any part of the larynx or trachea. As to the advisability of removing such tumors, if the growths are large or their situation is such as to interfere with respiration, an attempt should be made to remove them either wholly or in part. Otherwise it would be well to leave them alone.

SPASM OF THE LARYNX AND EPILEPSY.

In an article on laryngospasmus by PROF. H. WIDERHOFER (*Allgemeine Wiener med. Zeitung*, June 22, 1886, p. 304), it is stated that in nurslings epilepsy usually begins in the guise of spasm of the larynx, which continues at intervals for weeks or months, and becomes undoubted epilepsy in the second or third year. Sodium bromide is recommended in large doses: one-fourth of a gramme morning and evening in a spoonful of sweetened water.

LARYNGEAL NEUROSES OF CENTRAL ORIGIN.

DR. H. KRAUSE, of Berlin (*Arch. f. Psychiatrie und Nervenkrankheiten*, Berlin, 1886, Bd. xvii. H. 1, S. 288), examined some two hundred patients, with various central affections; those chiefly noted as causing functional disturbances of the larynx, comprising spinal syphilis, chorea, cerebral tumor, hemiplegia, plumbic paralysis, hystero-epilepsy, epilepsy, aphasia, railway spine, pseudobulbar paralysis, progressive paralysis, multiple sclerosis, bulbar paralysis, and tabes. The results of these observations are summed up as follows:

Chorea. Tremulous action of feebly distended vocal bands and paresis of the abductors in almost all instances. Choreic movements of the laryngeal muscles in none.

Spinal syphilis. In one case the left vocal band was immobile near the middle line, but became functionally active again in connection with return of function in the left extremities under treatment by inunction.

Plumbic paralysis. No laryngeal manifestations in six cases. In one case paralysis of left vocal band. In another, conspicuous tremulous movements of the vocal bands and adductor paralysis.

Cerebral tumor. In a case of gliosarcoma of the corpus striatum and left temporal lobe, the right half of the larynx was paralytic. This case confirms the existence of a cerebral centre for the laryngeal muscles, although of no value toward indicating its precise location.

Hysteria, hystero-epilepsy, and epilepsy. Hemianæsthesia of the mucous membrane of the nose, the soft palate, the pharynx, the larynx, and the trachea, mostly on the left side, as in the other parts of the body. In one instance perverse action of the vocal bands, namely, approximation on inspiration, and widest separation in expiration and phonation.

Railway spine. In two cases with widespread cutaneous anæsthesia, anæsthesia of the mucous membrane of the upper air-passages, except at a few irregular spots.

Pseudobulbar paralysis. One case showed marked adductor paresis of the right and total paralysis of the left vocal band. The left extremities were lamed. Post-mortem examination revealed several distributed foci in the medullary portion of the cerebrum.

Aphasia. Of four cases, one showed, during five weeks of observation, steadily increasing debility in the motor disturbances of the larynx, paresis of the voice muscles in fact, so that phonation was very laborious and the voice became deep and gruff.

Progressive paralysis. Nasal speech dependent on paresis of the soft palate;

deepening of the voice from relaxation and atrophy of the vocal bands; maintenance of the functions of the respiratory muscles.

Multiple sclerosis. The same as in progressive paralysis.

Progressive bulbar paralysis. Frequently unilateral paresis or complete paralysis of the soft palate, the constrictors of the pharynx, and the muscles of the larynx, with sensory disturbance also in sequence. Sometimes unilateral or bilateral median position of the vocal bands, such as has been hitherto exclusively attributed to paralysis of the posterior cricoarytenoid muscles, and which, as shown experimentally by Krause, is, in a great number of instances, produced by spastic contraction of the adductors; a view supported recently by A. Köhler, and particularly by Gerhardt and by Michael. In proof that this pathogenesis occurs in central lesions also, a case was adduced in which, after syphilitic infection during the course of bulbar paralysis, an intense sensation of choking occurred very suddenly, followed by continuous dyspnoea. The vocal bands in this case stood continuously immovably approximated, and so distended in the median position that the expiratory phonatory current of air could not set them in vibration, but vicariously set the ventricular bands into vibration. Post-mortem examination revealed, among other lesions, a fusion of the dura mater with the arachnoid, and irregular infiltration of the lower portion of the floor of the fourth ventricle. Here the differentiation can be only between spastic contracture and reflex contracture in consequence of a lesion of the nucleus of the superior laryngeal nerve. In a second case dyspnoea likewise occurred quite suddenly, while the patient was on the street, and was found due to bilateral adductor contracture.

Tubes. Of thirty-three cases, thirteen showed gross functional disturbances; pareses and paralysees of all varieties, that sometimes come and go and recur. At the same time, there are no gross voice disturbances in many instances. He cited a tabetic teacher who took part in concert singing despite paralysis of one vocal band. The most conspicuous appearance was true ataxia of the vocal bands, which moved outward with arrest half way to the abduction or inspiratory position; similar to the backward movements of the bulbi designated by Friedreich as ataxic nystagmus. In three cases with laryngeal crises there were characteristically irritative laryngeal manifestations with bilateral adductor contracture in each instance. Pencillings with cocaine were followed by marked diminution in frequency and intensity of the attacks, and in a case in Gerhardt's clinic even entire subsidence at times; a combination of phenomena which justifies Krause in maintaining a connection between these irritative manifestations and the paroxysms. Inasmuch, too, as degenerations of the vagus are found in cases of laryngeal crises, Krause concludes that the objective manifestations are due to reflex contracture of the adductors produced by the degenerative irritation in the superior laryngeal nerve, and that these manifestations are occasionally increased to complete spastic closure of the glottis by central or peripheral irritation.

In the discussion of this paper, THOMSEN called special attention to one of the cases of general progressive paralysis in which dyspnoëic paroxysms and pareses of the laryngeal musculature preceded the manifestations of psychic disturbance. REMAK controverted Krause's opinion as to unilateral adductor distention in central lesions with associated degenerative manifestations, cir-

cumstances under which the contracture would be secondary, as in paralytic clubfoot, in infantile spinal paralysis, or in congenital deficiency of certain spinal cord territories, as in his case of spina bifida. Krause, in reply, did not deny the occurrence of central or peripheric abductor paralysis; but did not believe that partial paralysis of the vago-accessorius nucleus, even when applicable to special cases, explained either the sudden onset of adductor contracture in certain other cases, or the constancy of manifestation in those previously described. The latter class of cases are explained better by assuming a lesion which affects all the nerve-fibre roots in the same degree; the adductor impressions from an irritative condition of all the fibres predominating, as issuing from the more powerful muscle group just as they do upon experimental electric irritation.

LARYNGEAL PARALYSES.

DR. J. CHARAZAC, of Toulouse, in a communication made to the French Society of Otolaryngology and Laryngology, April 30 (*Rev. Mens. de lar.*, etc., Mai, 1886, p. 241), discussed the question whether the abductor fibres of the recurrent are always affected first. After presenting a summary of the views of Semon, of London, and those of Hooper, of Boston, he reported a case of cystic goitre, in a man fifty years of age, with unilateral paralysis of the adductors consecutive to pressure upon the right recurrent nerve, and hence came to the conclusion that while the abductors have a tendency to become paralyzed before the adductors, they are not always affected first.

In a paper based upon experimental work presented at the recent annual meeting of the American Laryngological Association (*Medical News*, June 12, 1886, p. 659), DR. F. H. HOOPER, of Boston, shows that factors other than neurotic ones are often present to produce the abnormal positions of vocal bands frequently attributed to paralysis, and especially to paralysis of individual muscles. These factors are the relative sizes of the component structures of the larynx, such as the posterior vocal processes, the cartilages of Wrisberg, the aryepiglottic and thyroepiglottic muscles, and other peculiarities which, in individual instances, may have much to do with determining the position which vocal bands shall take both in normal and in diseased conditions.

DR. J. SOLIS COHEN presented to the American Laryngological Association the larynx and some microscopic sections of nerve tissue from the case of bilateral paralysis of the posterior cricoarytenoid muscles which he had exhibited in 1879 (*Medical News*, June 12, 1886, p. 660), and which had begun as a unilateral paralysis of the left side, with a marked tendency to spasm on titillation of the left auditory meatus. The larynx showed the fixed spastic position of the vocal bands in the middle line that they had occupied for nearly ten years during life. The posterior cricoarytenoid muscle of the left side was quite atrophied, that of the right side was much less atrophied, but the bundle of fibres of the arytenoid going from the base of the left cartilage to the top of the right was equally atrophied, and all the remaining muscles were apparently normal. The right recurrent laryngeal nerve, near to the point where it leaves the pneumogastric, showed marked atrophy of one-half of its area; the left nerve showed no pathological change. A small triangular cavity, two to four millimetres in extent, was found in the outer section of the lenticular nucleus.

FEEDING BY THE STOMACH-TUBE AFTER TRACHEOTOMY.

MR. S. HERBERT HABERSHON reports (*St. Bartholomew's Hospital Reports*, 1885, xxi. p. 79) five cases of recovery out of seven tracheotomies for membranous laryngitis, in which an important element of the success is attributed to the plan adopted by Dr. Bullar in feeding the patient through a soft catheter or elastic tube passed directly into the stomach through the nose.

LARYNGECTOMY.

DR. J. BARATOUX, in a study of this subject (*Le Progrès Médical*, March 27 and April 10, 1886, pp. 263, 308), presents a chronological table of 102 cases, of which 5 were too indefinite for analysis. Of the other 97, 14 were partial extirpations, 83 complete. Of the former there were 8 recoveries and six deaths; of the latter, 24 recoveries, 58 deaths, and 1 result unknown. Among the recoveries are included 5 complete laryngectomies of less than two months' standing, for carcinoma, 2 of which had been operated upon but a few days. Leaving these 5 out of consideration, there have been 47 deaths in epithelioma cases and 15 recoveries, if patients surviving from two months to a year may be counted as examples of recovery. One-third of the whole succumbed during the first week to shock, exhaustion, pleurisy, pulmonary embolism, hemorrhage (2), collapse (3), or pneumonia (11). One-fifth of the survivors succumbed before the end of the first month, six of them by pneumonia; and before the end of the fifth month more than one-third of the remaining survivors had succumbed. In sarcoma the results were better. The 7 deaths occurred between the seventh and eighteenth month, recovery having resulted in nearly half the cases, 3 of them still living at the end of three, five, and six years. Of 10 patients operated upon for stricture, stenosis, etc., more than two-thirds died, 5 of them in less than three months, 1 in less than six, and the last one in less than a year. Taking all the cases of total extirpation together, death occurred in half of them before the fourth month, and in more than two-thirds before the sixth month, except in the cases of sarcoma, which present but two instances of death so early. Taking all the cases of partial extirpation, recovery ensued in more than two-thirds. Following this analysis, indications are given for operating. Total extirpation seems to be indicated in malign neoplasms occupying more than one-half of the larynx but not yet extending into the neighboring tissues, provided the patients are not too advanced in life. Nevertheless, one of Hahn's patients sixty-three years of age survived three and a half years. It is contraindicated in all cases of benign neoplasm, papillomas, perichondritis or necrosis, in malign tumors which have invaded adjacent or distant organs, and in patients laboring under some additional grave malady. Partial is preferable to complete extirpation, because recurrence is no more apt to follow, and because an artificial substitute will not be necessary. It should be practised in cases of malign neoplasms confined to one-half of the larynx, in certain strictures due to fibrous transformations of tissue and hypertrophied and ossified cartilage which prevent ordinary methods of dilatation, but it should not be practised to cure simple strictures, papillomas, perichondritis, or necrosis. Following these remarks, Baratoux gives a description of the various operations, procedures, and subsequent manipulations.

DERMATOLOGY.

 UNDER THE CHARGE OF

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 HYDROA.

CROCKER (*British Medical Journal*, May 22, 1886) is among those who consider the term "hydroa" a rightful addition to our nomenclature, and as including diseases distinct from the pemphigus and herpes groups. Many forms of hydroa have been described, but most all of these may be properly placed under one head—"hydroa herpetiforme." This affection is variously described as "pemphigus pruriginosus" (Chausit and Hardy); "herpes gestationis" (Milton and Bulkley); "herpes circinatus bullosus" (Erasmus Wilson); and "dermatitis herpetiformis" (Duhring). It is now well known that this disease is not, as has been supposed, confined to pregnant women. The author gives a detailed report of eight cases which came under his observation in the last year. Although the lesions of hydroa herpetiforme are usually erythematous, vesicular, and bullous, they may also be pustular. Crocker cannot yet agree, however, with Duhring in considering impetigo herpetiformis of Hebra identical with this disease. The affection differs in several particulars: in the total absence of erythematous, vesicular, and bullous lesions, the eruption being pustular throughout; in the absence of pruritus; in fact, that the general symptoms are severe, and in all but one case terminated fatally.

From a study of the literature and personal cases the following conclusions are adduced: 1. There is a group of diseases—distinct from pemphigus, herpes, and erythema exudativum, whilst sharing some features with all of them—for which the term "hydroa herpetiforme" is convenient, and has the advantage of being already partially adopted. 2. It would give greater clearness to the term hydroa if it were restricted to diseases of the type discussed, and not made to include diverse anomalous bullous eruptions. 3. The feature which characterizes the group is the presence, at some period of the disease, of erythema, chiefly, but not exclusively, of a circinate type, of vesicles, bullæ, or pustules, with a tendency to group herpetiformly. These different elements are present in varying ratio to each other, now one, now another, predominating and overshadowing the other; but the disease is always accompanied by intense pruritus, and the eruption tends to undergo evolution and involution at the periphery and centre respectively. The disease generally runs a long, but ultimately favorable course, with frequent exacerbations and remissions, with a strong tendency to recur, even after long intervals, but it is generally amenable to careful, persevering treatment. The author advises an improvement in the patient's general surroundings, proper and nutritious

food, and mental and bodily rest. Arsenic has proven a most reliable remedy, but must be given in increasing doses, even to its physiological limit. In some cases, in which arsenic failed, good results were obtained with tincture of belladonna in full doses. In debilitated patients, cod-liver oil is indicated, and in some cases quinine, in two to five grain doses, as recommended by Tilbury Fox, proves useful. The best local application, in the author's experience, for the control of the pruritus, is a lotion consisting of two drachms of liquor carbonis detergens, to eight ounces of water.

A CASE OF LICHEN PLANUS.

A marked, and in some respects exceptional, case of lichen planus is reported (*Lancet*, July 17, 1886, p. 124) by FINNY. The eruption occurred upon all parts, except the head and face. The patient, a female, aged fifty-three, at the time of outbreak was suffering from nervous prostration. The disease began in small patches below the knees and rapidly invaded other parts. It was most marked, both as regards size of the papules and extent of the patches over the back, loins, abdomen, and vastus internus of the thigh. The papules in the palm and soles were few and scattered. Extensive plaques were formed by contiguity of papules rather than by confluence, and gave rise to a "peculiar tessellated or mapped-out appearance of the skin." The papules were smooth, waxy, or glazed, some of which exhibited a slight filmy desquamation. The case yielded rapidly to arsenic. Of the local remedies employed, warm alkaline baths and lotions of carbolic acid and liquor carbonis detergens gave the most relief.

CASES OF ORBITAL NÆVI TREATED BY ELECTROLYSIS.

Several cases of nœvi about the orbit, successfully treated by electrolysis, are reported (*Lancet*, July 24, 1886) by SNELL. A current of six to ten cells usually suffices, several punctures being made, with the negative pole, at the one sitting, the needle of the positive pole being kept stationary. The patients, five in number, were all infants, varying in age from early infancy to nine months. Several operations, at intervals of several days or weeks, were usually required for complete success.

THE RELATION OF LUPUS VULGARIS TO TUBERCULOSIS.

A communication based upon clinical study of the relationship of lupus vulgaris to tuberculosis is made (*Deutsche medicinische Wochenschrift*, June 17, 1886) by MAX BENDER. In three years 374 cases of lupus came under observation, but for lack of notes and history, the analysis, as regards the point under consideration, is based upon an aggregate of 159 cases. In 99 (62.3 per cent.) of these cases present or past evidences of tuberculosis were noted. Hereditary predisposition was disclosed in 53 cases (33.3 per cent.). From the history alone the relationship was disclosed in 77 cases (48.7 per cent.). At the time of examination other evidences of tuberculosis were present in 76 cases (47.7 per cent.). Based upon the history and present condition the whole number in which a positive relationship was shown, was 109, or 68.5 per cent. Two of the cases while under observation died of other forms of tuberculosis—one, of tubercular meningitis, combined with caries of the petrous bone, and the other, of laryngeal and pulmonary tuberculosis.

Incidentally to the main purport of the paper, the comparative frequency of lupus vulgaris upon the different parts of the body is given, based upon the whole number (374) observed: face in 115; nose in 70; upper extremities in 40; cheeks in 35; nose and face in 25; lips in 16; nose and lips in 15; lower extremities in 15; face and neck in 12; face and extremities in 6; temporal region and forehead in 6; chin in 3; face and arm in 3; ear in 3; entire body in 2; scalp in 2; eyelids in 2; palate in 1; hand and foot in 1; nape of neck in 1; back in 1.

MOLLUSCUM CONTAGIOSUM—AN ANALYSIS OF FIFTY CASES.

ALLEN (*Journ. Cutan. and Ven. Dis.*, Aug. 1886) has had opportunity, in a children's asylum, of treating a large number of cases of this disease. The disease, as stated by an attendant, was first observed on a young girl brought to the institution a year previously, since which time other children had become affected, numbering in all about fifty cases. The favorite sites for the eruption were, in the order named, eyelids and region about the eye, other parts of face and neck, nose, lips, hands, chest. In eight cases of those affected were found also common warts. On the arms of several patients was noted a flat variety of wart with pink border, resembling in a measure the molluscum tumor, excepting that it had no central opening, was of firm consistence, difficult to remove, and did not present the gland-like structure. In addition to the asylum cases, the writer mentions a case which came, in 1883, to the New York Hospital. This patient was a married woman, aged twenty-five, and presented a group of molluscum tumors on the neck, which had appeared several months before, "at a spot where her child, who also had the disease, rested his face when she carried him." Subsequently the child referred to was seen, and still showed the presence of the disease in the face. Several efforts at reproduction by inoculation were practically negative.

The cases, as the author states, do not bear out the suggestion offered by some writers that irritation of the skin is a potent factor in the production of the disease. Although scabies existed in the asylum at the same time, many of those who had molluscum did not have scabies, and the faces thickly studded with mollusca were, as a rule, remarkably free from scabies, and scarcely a tumor was found upon the scratched and irritated body. Nor did the cases add to the theory that maceration of the skin and frequent bathing favor the production. The author thinks, however, that maceration or moistening of the surface from perspiration, as when the face of an infected child presses against the mother's face or breast, may favor the propagation by contact, by affording a more favorable nidus for the contagious principle. Although not assuming to discuss the disease pathologically, the writer incidentally states that the presence of the mollusca upon the vermilion border of the lips, as observed in several of his cases, is a strong clinical point against the theory of its origin in the sebaceous glands. Other authors are quoted in support of the contagious nature, a view in which the writer, for the following reasons, shares:

1. The cases reported by Bateman, Mackenzie, Fox, Liveing, and others, and the one mentioned in this paper (New York Hospital case), where the child first had the disease, and the mother afterward, upon the face, neck, or breast, are difficult of explanation by any other theory.
2. The spread of the

disease in families, schools, and institutions. Liveing (*Lancet*, Oct. 5, 1878) reported nine cases occurring coincidently in a school. 3. The fact that the parts exposed to contact are those almost solely affected: the face in children, the breasts in mothers, and the genital region in adults, and especially in prostitutes and the men who visit them. 4. The reported successful inoculation. 5. That negative evidence has no weight. It is not always possible to inoculate other diseases which are well known to be contagious.

NOTES UPON LANOLIN.

G. H. FOX has contributed a brief summary of his experience with lanolin. Regarding the absorbability by the skin, comparative experiments were made. On one forearm of a young girl, a certain quantity of lard was rubbed in for a specified length of time; on the other, the same was done with lanolin. It was found that two-thirds of the lanolin had disappeared, and but one-third of the lard. Another and similar experiment made with lard and vaseline showed that the former was somewhat more readily absorbed than the latter, but the difference was slight. Liebreich stated, as proof of rapid absorption of drugs by means of lanolin friction, that an ointment of one part of corrosive sublimate to one thousand parts of lanolin rubbed into the skin will produce a metallic taste in the mouth; Fox failed in numerous experiments, personal and upon others, to get this evidence of its absorption. In some subjects of experimentation, the author adds, this "metallic taste was noted; but it is possible that a similar effect might have followed the use of lard or even vaseline." Respecting its clinical value, the author failed to see any remarkable beneficial results from its use; but, on the contrary, found in some instances its color and consistence objectionable. Moreover, in some acute inflammatory cases, it was not found to be so bland as had been represented. Used side by side with vaseline or lard in the same cases, patients usually expressed a preference for the latter. Nor was it absorbed so readily as to attract the patient's notice to the fact. The writer concludes: 1. Lanolin is more readily absorbed by the skin than any other fatty substance. 2. As a basis for ointments it is useful when an effect upon the deeper skin or upon the whole system is desired. 3. On account of its firm consistency, it is advisable to mix with it a certain amount of lard, especially in cold weather. 4. When applied to a highly inflamed skin, lanolin may not prove as bland as *fresh* lard or *pure* vaseline. 5. Considering its recent introduction, its questionable superiority, and its present cost, it cannot be recommended, as yet, as the best basis for all ointments.

The advantages of lanolin as an ointment basis, as asserted by Liebreich, are confirmed (*Brit. Med. Journ.*, June 12, 1886) by W. G. SMITH, who states that its several properties entitle it to careful consideration. "It is capable of absorbing and intimately blending with large amounts of water, standing thus in marked contrast to popular notions of the mutual relation of water and fats. The lanolin of commerce is a combination of neutral cholesterin-fat with about thirty per cent. of water. 2. It is neutral to test-paper, is not liable to rancidity, and is not easily saponified by alkalis. 3. It is miscible with glycerine, unlike other fats. 4. It possesses the power of penetrating the epidermis rapidly, and in a remarkable degree. 5. Hence lanolin greatly facilitates the absorption through the skin of drugs mixed with it. So marked

is this that, with poisonous drugs, such as the toxic alkaloids, about half the usual proportion should be prescribed as ointments. The vaselines and paraffines hinder, rather than favor, the passage of drugs into the skin." Several cases are given in illustration of its favorable effect. In a case of eczema rubrum of the legs, which had been under treatment by the more common methods, a speedy cure was effected by using an ointment consisting of lanolin ℥xij; adipis benz. ℥j; liq. plumbi subacet. ℥xv; acidi carbol. ℥ij; ol. lavand. ℥v. In a case of psoriasis lanolin was used as a basis for chrysarobin (twenty grains to the ounce) with favorable result. In chapped hands, friction with the pure lanolin was satisfactory. In the author's experience lanolin was found non-irritating. For general use, its stickiness should be counteracted by the addition of one-eighth to one-fourth its proportion of another fat, such as lard, castor oil, etc.

LIEBREICH (*Brit. Med. Journ.*, July 17, 1886) calls attention to an improved preparation of lanolin—lanolinum purissimum. The earlier product contained the not readily fusible cholesterine ethers and rendered an addition of fat or glycerine necessary in order that the ointment be more easily rubbed in the skin. This pure lanolin has the proper consistence for ointments, and is ready for application without the addition of either of the above substances. This improvement is important, as the addition of glycerine or fat to lanolin is prejudicial to its keeping properties.

MIDWIFERY.

UNDER THE CHARGE OF

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PALPATION OF THE UTERUS PER VAGINAM.

SÄNGER (*Arch. f. Gyn.*, xxviii. p. 54) publishes a series of cases of urinary disorders in which the ureters could be distinctly felt per vaginam. They were about as thick as a goose-quill, and felt in the upper third of the vagina, beginning about 2 cm. (0.75 in.) below the portio vaginalis. The ureters cannot be felt in every woman, but are frequently to be made out during pregnancy. Säger succeeded in eight out of ten cases of pregnancy, but has never felt them during the lying-in period. The reason why they can be often felt during pregnancy is that they are hypertrophied, and that during the second half they can be pressed against the presenting head.

Observations made on the dead subject coincide with the clinical ones in every respect. Säger concludes that it is often possible to feel the pars pelvica of the ureters per vaginam, from the points at which they enter the bladder to the base of the broad ligaments, a distance of at most 6-7 cm. (2½ in.)—one-half the length of the pars pelvica, and one-quarter the total length of the ureters.

In pregnant women they can be felt for 10 cm. (4 in.). Säger thinks it of

much clinical importance in any case of urinary disorder to palpate the ureters in order to discover whether they are healthy or not.

CASE OF TWINS OCCUPYING A COMMON AMNIOTIC CAVITY IN WHICH THE CORDS WERE INTERLACED AND COILED ROUND FŒTAL PARTS.

SEDLACZEK records a case of the above rare event (*Arch. f. Gyn.*, xxvi. p. 309). A. B., æt. thirty, VI-para, aborted of twins at the fourth month. The two placentaë were adherent to one another, and extracted under chloroform. Only one amniotic cavity present. Both fœtuses were found to be macerated, and at various places showed grooves at the points where the umbilical cords had been coiled round parts of the fœtus. The two cords were much above the average length, considering the size of the fœtuses, and inserted close together into the common placenta.

That of the first-born fœtus passed from the placenta to the left knee, there forming a loop round the thigh just above the patella. The fetal end of the same cord also ran to the knee, and was squeezed against it by the above-named loop. The two portions of the cord—*i. e.*, the placental and fœtal portions—thus brought together, now twisted spirally round one another three times, and after diverging for a short distance, again became approximated to enclose the cord of the second fœtus, this point lying close to the right shoulder of the second fœtus. From there they passed to the front of the neck of the latter, and after separating to embrace it became continuous with one another.

The cord of the second twin ascended from the navel to its right shoulder-joint, where it was held fast by the other cord. Thence it bent outward and passed through the gap left by the other cord to the placenta.

For references to similar cases, and for an exact figure of this one, the original paper must be consulted.

PREGNANCY IN ONE HORN OF UTERUS BICORNIS; RETENTION OF THE MATURE FŒTUS; REMOVAL OF THE PREGNANT HORN.

WIENER (*Archiv f. Gyn.*, xxvi. p. 234) records a case of the above in which laparotomy was performed on account of a tumor on the right side of the abdomen, which was seriously affecting the patient's health. The nature of the case was very obscure, some features in the woman's previous history pointing to pregnancy, others to the presence of another form of tumor. On opening the abdomen a uterus bicornis was found, the right horn being pregnant. This was opened, and the fœtus, which was in a state of commencing maceration, extracted. The uterine horn in which the latter had lain was then cut off, the pedicle tied, treated with iodoform, and returned into the abdominal cavity. The patient made a good recovery. The fœtus had all the characters of maturity, and measured 52 cm. (20 in.).

Wiener points out that this rare case must be added to some others recently published, which show that it is not impossible for pregnancy to reach its natural duration in a rudimentary uterine horn, as was formerly assumed to be the case.

ON ADENOMA OF THE PLACENTA.

KLOTZ (*Arch. f. Gyn.*, xxviii. p. 39) describes a new disease affecting the decidua serotina and of the nature of an adenoma. Mrs. L. aborted of a fœtus about 7 cm. (2.75 in.) long, the placenta not coming away. She got up on the fourteenth day, but repeated hemorrhages came on for the next two months, when Klotz saw her. He dilated the cervix, and found on the posterior wall a soft, crumbling tumor, as large as a large oyster-shell. This he removed with a sharp spoon, in pieces of varying size, and it proved to be of placental origin.

A year later Klotz again saw her, owing to repeated profuse menorrhagia, and again found an irregular crumbling growth, which he treated with the curette. This cured her trouble.

Klotz then goes into a minute description of the histology of the removed masses, which were found to consist largely of adenomatous tissue. His conclusions are as follows:

Adenoma of the placenta originates from the dilated glandular spaces of the decidua serotina; it is started by a fusion of the decidual cells into a homogeneous, nucleated, protoplasmic mass (similar to embryonic connective tissue), and by a conversion of the glandular epithelium into a special epithelium-forming layer, into what Klotz terms "epithelial zuchtzellen." The protoplasmic substance above referred to, grows out in the form of projections, the connective tissue elements taking the largest share in the growth. By further growth and proliferation these various projections become multiplied and interlaced, and form nodules of adenomatous tissue.

After removal of the placental portions that have been converted into adenomatous tissue, the adenomatous growth may recur. The adenomatous degeneration seems to lead to death or expulsion of the fœtus, and to prolonged retention of the placenta.

Klotz has seen this adenomatous growth in three cases, in all of which the symptoms were very similar; recurrence was seen only once.

ON HABITUAL DEATH OF THE FŒTUS IN UTERO DUE TO RENAL DISEASE IN THE MOTHER.

FEHLING (*Arch. f. Gyn.*, xxviii. p. 300) publishes some observations in which renal disease in pregnant women appeared to be connected with habitual death of the fœtus. Five cases are recorded in which albuminuria was detected during pregnancy, sometimes due to chronic parenchymatous nephritis, sometimes to true granular kidneys. In one or two instances constitutional sequelæ caused by the contracted kidneys showed themselves.

Fehling cannot as yet say whether the albuminuria preceded pregnancy or was secondary to it, but the former view is the more probable. In several patients slight albuminuria persisted after delivery, increasing every time pregnancy recurred. The rapid diminution of albuminuria after the death of the fœtus was very marked. No evidence of syphilis could be detected in either parents or fœtus.

The renal disease in these cases led to the death of the fœtus, owing to the placenta having become infiltrated with white infarcts, and to its healthy tissue, therefore, no longer sufficing to nourish the fœtus. The latter was

usually expelled six to eight or even more weeks after death. The placenta was invariably smaller than normal, or even atrophied, the weight being below the average. The infarcts consisted of fibrin nodules, such as are often found in small numbers even in healthy placenta. In addition to the usual wedge-shaped nodules, Fehling found others irregular in form, tough, and solid on section or filled with vacuoles.

The prognosis for the child is very bad; in only one of Fehling's cases was the life of the child saved, and then only by the induction of premature labor. The prognosis is more favorable to the mother, but where the renal disease is severe she runs great risk from eclampsia and uræmia.

HYDRASTIS CANADENSIS DOES NOT INDUCE UTERINE CONTRACTIONS.

SCHATZ (*Berl. klin. Woch.*, May 10, 1886) again discusses the action of hydrastis canadensis, and defends his original view that while the drug has a vasomotor action on the uterus it does not directly act on the muscular fibres and cause them to contract. Fellner, from recent experiments, believed that such a direct action did occur at any rate in dogs and rabbits, but Schatz thinks the contractions that Fellner noticed were more probably secondary to the anæmia produced by the drug and not caused by its direct action on the muscular tissue. In this respect it differs from ergot, and may be advantageously used where the latter would be injurious owing to the contractions it might produce.

ON THE ETIOLOGY OF FACE PRESENTATIONS.

SCHATZ (*Arch. f. Gyn.*, xxvii. p. 293) publishes two cases of face presentation produced by an ill-developed shape of the uterus. Some uteri, instead of having two long sides and one short one (at the fundus), are equilateral, or the base may be even longer than the sides, so that the uterus is wider than long. In face presentations the fœtus is flexed on its dorsal aspect, and Schatz thinks that the equilateral form may produce this dorsal flexure. The fœtus will lie most conveniently in such a uterus if the head and breech occupy two corners and if the body is flexed in the direction of the third angle. If the dorsum looks toward the latter, the vertex or breech will probably present; if the abdomen, the fœtus will be extended, and a face presentation may be the result.

Supposing, now, the breech to lie in one of the upper corners and the head at the os, the form-restitution force of the uterus would tend to displace the head of the child toward the side of the pelvic inlet opposed to that on which the breech is placed. If the head is movable above the brim, a transverse presentation will result with the dorsum downward. But if the head has engaged in the brim it can no longer be displaced, and the form-restitution force of the uterus will cause it to be extended and possibly cause the face to present. The author shows no reason for his opinion as to cause and effect. The phenomena seem capable of the converse interpretation.

INJURIES OF THE VAGINA AND PERINEUM ACCOMPANYING LABOR.

FREUND (*Gyn. Klinik.*, vol. i. p. 135), after briefly mentioning the injuries to the cervix associated with labor, describes those of the vagina, and points

out that their frequent occurrence at particular parts of the vaginal canal depends on the anatomical structure of the walls at those parts, and on the extent to which they are stretched during labor. The regions most likely to tear are, according to him, in the laquear vaginae, the lateral portions (where the injuries are usually prolonged from tears in the cervix); in the middle portion of the vagina, the posterior wall, especially the portions on either side of the columna rugarum posterior; and, lastly, at the floor of the pelvis, also the posterior portion. The portion bounding the columna rugarum posterior is especially liable to give way on the side on which the face descends. At the anterior vaginal wall the parts on either side of the columna rugarum anterior are occasionally endangered, especially in presentations with vertex anterior, and at the anterior wall of the vulva the pressure of the descending head often leads to bruising of the structures lying near the symphysis and the pubic arch.

The above injuries may occur where the vagina is of normal structure, but are most frequent where predisposing influences are present. Freund mentions four such: 1. Cicatrices in the laquear left by previous parametric and paravaginal inflammatory processes, by operations for fistula, by excision of large vaginal cysts, etc.; 2, rigidity of the vagina in elderly primiparae, which especially affects the lower third, and rarely (in persons above forty) the vaginal fundus; 3, congenital narrowness of the vagina, with a generally contracted pelvis or a general infantile formation of body; 4, limited extensibility at certain places, especially where bony masses project into the pelvic canal—*e. g.*, unusually prominent ischial spines.

The severest injuries of the parturient canal are associated with the application of forceps, owing to the circumference of the head being increased by the forceps, to the acceleration of the exit of the head, to the edges of the blades where they are unsymmetrically applied to the head, to the increased relative displacement of the vaginal walls, and to the normal mechanism of delivery being interfered with. The injuries usually affect the same parts as those associated with spontaneous labor, but are more severe.

Freund then discusses the influence which Tarnier's axis-traction forceps has on the production of vaginal injuries. As regards the first four points mentioned above, he finds no great difference between Tarnier's and other forceps, but regards it as especially useful where the head lies in the pelvic brim or is still movable above it.

PROLAPSE OF THE UMBILICAL CORD THROUGH THE RECTUM.

STROYNOWSKI (*Centralbl. f. Gyn.*, May 29, 1886) publishes an instance of the above rare occurrence during labor. Shortly after rupture of the membranes, a loop of the umbilical cord, 24 cm. (9½ inches) long, was observed to be prolapsed through the rectum. The child, well-developed, but partly asphyxiated, was expelled about half an hour afterward, drawing the prolapsed umbilical cord with it. It was successfully resuscitated.

On vaginal examination post-partum, an aperture could be felt immediately above the perineum, and leading into the rectum, through which the prolapse had occurred.

Stroynowski thinks that either the recto-vaginal septum was unusually weak and gave way before the pressure of the head, or that the midwife per-

forated the septum in attempting to force down the head by pressing on it per rectum. The tear healed entirely.

ON THE CONTINUOUS CATGUT SUTURE IN CASES OF RUPTURED PERINEUM.

Various writers have recently recommended continuous catgut sutures in the place of ordinary interrupted silk sutures for bringing the edges of wounds together. KELLER communicates to the *Archiv f. Gyn.*, xxvi. p. 283, the results he has obtained in applying this form of suture to cases of ruptured perineum, results, much better, he says, than those formerly seen when interrupted silk sutures were used.

The plan Keller adopts is the following: After removal of the after-birth, the vagina is irrigated and the sides of the tear are thoroughly cleansed with a solution of corrosive sublimate 0.5 per 1000. He then proceeds to sew up the wound, beginning at the edge of the vagina with an ordinary knotted suture and then carrying a continuous suture in spirals back toward the anus. On reaching the posterior end of the tear the end of the continuous suture may be fastened by knotting it in with an ordinary interrupted suture or it may be tied on to the last spiral turn. In a few cases in which the edges did not come into very accurate contact Keller used one or two superficial interrupted catgut sutures in addition to the deeper continuous ones. The wound when sewn up was covered with iodoform collodium and the patients told to be quiet; their legs were never tied together. Keller was greatly pleased with this form of suture. The line of union was smooth and regular, much more so than with the ordinary *modus operandi*. He ascribes this partly to the edges having been brought into more accurate contact, partly to the greater elasticity of catgut. In forty-one out of forty-two cases, the results were highly successful. One special advantage of the catgut is that it undergoes absorption and therefore does not need removal.

ON THE APPLICATION OF THE FORCEPS TO THE AFTER-COMING HEAD.

FREUDENBERG contributes an article to the *Centralbl. f. Gyn.*, March 27, 1886, in which he combats Lomer's view that it is a difficult operation to apply the forceps to an after-coming head, partly because the foetal parts block up the vagina, partly owing to the firm impaction of the head caused by previous attempts at extraction. Freudenberg maintains that if the body of the child is properly held it cannot cause any difficulty to the forceps being passed up along the sacral concavity, and when the blades reach the brim there is always plenty of room near the sacro-iliac synchondroses for them to glide up even if the head is impacted in the antero-posterior diameter.

The application of the forceps is usually even easier when the head has descended into the pelvic cavity, though Freudenberg does not deny that in exceptional circumstances it may be difficult.

These cases of an after-coming head have some advantages peculiar to themselves: the delivery of the trunk which has already taken place has thoroughly dilated the soft parts; the neck forms a good guide to the head, and the fixed condition of the latter is a help in applying the forceps. Freudenberg agrees with Lomer that this operation is sometimes the means of saving a child's life, but thinks he has overrated the difficulty attending its execution.

RECENT IMPROVEMENTS IN THE PERFORMANCE OF CÆSAREAN SECTION.

SÄNGER contributes a lengthy article to the *Archiv f. Gyn.*, vol. xxvi. p. 163, on the above subject, in which he contrasts the advantages of the Cæsa-rean and Porro's operation and discusses the improvements that have lately been introduced into the performance of the former. He also publishes a successful case of Cæsa-rean section.

The all but unanimous approval with which Porro's operation was received and which it has till lately enjoyed, is due to the high mortality which formerly accompanied Cæsa-rean section. That excessive mortality is, however, avoidable by means of modern improvements in the *modus operandi*, so that, although Porro's method continues best for some cases, it can no longer be allowed to retain its preëminent position.

The following are some details of the Cæsa-rean section which Säger performed according to his improved method:

A. S., æt. twenty-one; generally contracted, flat, rickety pelvis; conjugata vera, 6 to 6.5 cm. (ca. 2½ in.) The operation was undertaken as soon as the pains had become strong and the os fully dilated. The abdominal incision measured 16 cm. (6¼ in.), the uterine nearly as much. In making the latter, the placenta was encountered in its whole length and partly cut, and partly torn through, after which the child was extracted. Hemorrhage moderate in quantity. The child was extracted in a state of partial asphyxia, but soon revived.

The uterus was now drawn out of the abdomen and supported on a napkin; the placenta was removed and the lower part of the uterus constricted with an India-rubber tube. No fresh hemorrhage followed the removal of the placenta, and altogether the discharge of blood from the edges of the uterine incision and from the cavity was very moderate. It was most abundant from the lower portion of the incised surface which was found to have involved the lower segment of the uterus.

The next step was the resection and sewing up of the uterus. Säger first of all detached the serous membrane for a distance of 3 to 4 mm. (0.15 to 0.2 in.) along the whole incision, and then removed a slice of muscle from each incised surface 1 to 2 mm. (0.4 to 0.8 in.) in thickness. Twenty-eight sutures were used to bring the edges of the wounds together, eight being silver, and twenty silk. The silver were passed through the entire depth of the uterine wall on each side and then twisted.

The superficial peritoneal silk sutures were so inserted as to bring the opposed surfaces of the liberated strips of serous membrane into accurate contact. When they had all been inserted, the tube constricting the uterus was removed, but scarcely a drop of blood made its appearance. The uterus was washed with corrosive sublimate, 1 : 1000, and returned into the abdomen, the wound in the latter being closed in the usual way.

The patient did well after the operation; the highest temperature being 37.9° C. (100° F.); highest pulse-rate, 120. The patient was able to leave her bed on the fifteenth day.

Säger next proceeds to discuss the various steps in the operation.

He recommends corrosive sublimate for disinfecting the abdominal skin and generative organs before the operation. In making the uterine incision

the lower segment should be avoided owing to the circular sinus and large veins lying there. He believes that the numerous deaths from hemorrhage that formerly accompanied Cæsarean section were due to those vessels being divided. The limits to which it is safe to go may be ascertained by the looseness of the peritoneum over the lower segment, and the length of the incision should be regulated accordingly.

As regards the incision involving the placenta, Säger's case showed that even when the latter lay in the direct line of incision, no great hemorrhage or difficulty need be experienced, nor was the insertion of the sutures rendered more difficult. He thinks it much more serious to wound the coronary vein of the lower segment than to incise the placenta.

Säger goes fully into the best way of sewing up the incised uterus, and strongly commends the plan of using what are termed "musculo-muscular and sero-serous sutures;" the former being deep, the latter superficial. Three other points are important: rigid antisepsis, leaving the decidua uninjured by the stitches, and the use of such materials for the sutures as are not easily absorbed—*e. g.*, silver and silk.

In inserting the sutures it is most important that two peritoneal *surfaces* be brought into intimate contact; this is far safer than merely bringing the two *edges* together, though success has been attained on the latter plan. In order to approximate the surfaces, it is best to liberate a margin of serosa and to cut away a thin slice of muscle on each side. Säger thinks a thickness of 2 mm. (0.1 in.) quite enough, and has seen no harm from it. The serosa should be liberated for a distance of 4 mm. (0.2 in.). The sutures should be inserted as close together as possible, one helping to support the other. Moreover, it is best that the sutures should not penetrate the uterine cavity, but run beneath the decidua, otherwise there is risk of the lochia penetrating into the uterine tissues at the points traversed by the sutures and leading to septicæmia. Neither silver nor silk sutures do harm. Silk is entirely absorbed in process of time; silver may either become embedded in the uterine wall and remain innocuous indefinitely, or be discharged into the uterine cavity. A solution of corrosive sublimate is the best for washing the uterus.

These improvements in the performance of Cæsarean section have greatly modified its position *versus* Porro. So long as Cæsarean section "was almost certain death," Porro's operation, with a mortality of fifty-six per cent., was preferable. Now, however, that modernized Cæsarean sections can show a mortality of only forty per cent., while they have the advantage of not depriving a woman of her uterus and ovaries, they should be regarded as far superior operations.

THE ETIOLOGY OF PUERPERAL MASTITIS.

BUMM (*Arch. f. Gyn.*, xxvii. p. 460) discusses the share played by micro-organisms. He has met with two kinds of cocci in mammary abscesses, which differ partly by microscopical characters, partly by their mode of growth in cultivating media. The "*staphylococcus pyogenes aureus*" forms colonies, which are at first white, afterward golden-yellow. The microscopical characters depend on the treatment—*e. g.*, on staining—adopted; sometimes the shape is circular, sometimes that of a diplococcus. The streptococcus, on the other hand, has some similarity to a chain. Where staphylococci are

present, the abscess begins with deep-seated inflammation, which gradually spreads to the surface; while abscesses due to the streptococcus usually begin with superficial inflammation, followed by an infiltration of the deeper parts and suppuration.

Staphylococci grow readily on almost any nutritive soil, but the streptococcus is not so easy to cultivate. It grows best in agar-agar, forming smaller and more delicate colonies than does the staphylococcus.

Hitherto fifteen cases of suppurative mammary abscess have been published in which cocci were discovered. In eleven the "staphylococcus pyogenes aureus" (or albus) was present; in four the "streptococcus pyogenes."

Bumm believes that these cocci directly provoke the phlegmonous inflammation by their growth and proliferation. The abscesses usually arise by abrasions of the cuticle, though the infection occasionally travels up the milk-ducts.

Bumm also searched for bacteria in milk just taken from women. Great differences were found; sometimes one part of the milk examined contained bacteria, another part none. The distance, also, to which bacteria penetrate into the lactiferous ducts varies greatly, but Bumm feels no doubt that pyogenic staphylococci do pass into the interior of a gland by means of the milk-ducts.

He concludes from his observations that the usual belief as to the danger of allowing milk to stagnate in the mammary glands is well founded.

ON THE ELIMINATION OF VARIOUS SUBSTANCES THROUGH THE MILK.

FEHLING (*Archiv f. Gyn.*, xxvii. p. 332) publishes some observations made to determine what drugs or articles of diet administered to a suckling woman affect her milk.

Salicylate of sodium and iodide of potassium may be detected in large quantities in the milk of woman and pass out both in her own and in the infant's urine.

Ferrocyanide of potassium passes out in the mother's urine but not in the child's. Its amount in the milk is very small.

Fehling also made some observations as to the effect of the application of iodoform to perineal lacerations in the mother. He was able to detect the presence of iodine in her milk and urine, and sometimes but not always in the child's urine. No harm was ever found to result to the child from the application of iodoform to its own body (*e. g.*, to the navel) or to its mother while suckling it.

When mercury was given to the mother, the effect on her infant varied greatly; but generally none could be detected in the latter.

Fehling also investigated the influence on the child of acids given to the mother. He tried citric, hydrochloric, and acetic acids, but none of them affected the reaction of the mother's milk or appeared in any way to disturb the child.

Fehling made similar experiments with narcotics. He gave *tr. opii* \mathfrak{m} xxv, to a series of nursing women; in no case did the child become more sleepy or constipated or appear less ready to take the breast. Morphia given subcutaneously in the ordinary quantities was also tried. As a rule, the child was quite unaffected; in one or two instances it seemed to sleep rather long,

but not to a very unusual extent. These experiments show that a mother who has had a subcutaneous injection of morphia may nurse her child without any risk of the drug doing it harm.

Chloral was given to the mother in doses of 1.5 to 3 grammes (gr. 23 to 46); in no case did it produce any alarming symptoms in the child, though occasionally the latter appeared somewhat more restless or sleepy than usual.

As regards atropine, Fehling found that when given to the mother it passed into the infant and dilated its pupils. No harm, however, resulted to the child even when the mother took large doses.

HOW CAN MOST AIR BE MADE TO PASS IN AND OUT OF THE CHEST OF CHILDREN BORN IN A STATE OF ASPHYXIA?

Various writers have recently discussed and sought to establish by experiment the relative value of Schultze's, of Silvester's, and other methods for resuscitating children born in a state of asphyxia.

LAHS (*Archiv f. Gyn.*, xxvi. 273) recommends a somewhat different experimental procedure. He thinks that the use of a manometer for deciding between the rival methods is misleading, for it merely indicates the pressure at which air passes in and out of the chest, while the determination of the quantity of air is of far greater importance. This Lahs attempts to estimate by a modification of Hutchinson's spirometer.

LaHS, moreover, criticises and objects to the methods adopted by Behm and Torggler. These experimenters brought their manometer into direct connection with the trachea, thus avoiding the obstacle opposed by the glottis. A better plan, according to him, is to connect the spirometer with the pharynx through the nostrils, so that the natural obstruction offered by the larynx is not interfered with; moreover, the stomach under these circumstances can admit some air, as it is known to do during efforts at resuscitation.

LaHS considers the question still unsettled as to which is the best way of expanding the lungs of an asphyxiated newborn babe; but future observations should be made on the above lines, and the result will probably be in favor of Schultze's or Silvester's to the exclusion of others.

ON THE VALUE OF SCHULTZE'S SWINGING MOVEMENTS FOR RESUSCITATING APPARENTLY STILLBORN CHILDREN.

SKUTSCH (*Centralbl. f. Gyn.*, May 22, 1886) tested the value of Schultze's swinging movements under the following circumstances. Vertex presentation; membranes intact. Fœtal movements and heart sounds heard two hours before rupture of the membranes; after the latter event the child was rapidly expelled, stillborn, but with all the signs of maturity. Percussion of lungs showed impaired resonance everywhere. Skutsch at once began to swing the child fifty times, according to Schultze's directions. After the fifteenth swing, inspiratory and expiratory sounds became audible. Chest again percussed: gave a resonant note over every portion of the pulmonary area and a post-mortem showed that the lungs contained a considerable amount of air. Skutsch concludes that Schultze's swinging movements are a satisfactory means of filling collapsed lungs with air.

The dispute on this subject seems somewhat purposeless. The experiments of Champneys in the *Medico-Chirurgical Transactions* (also AMERICAN JOURNAL OF THE MEDICAL SCIENCES for April, 1886) have proved that Schultze's method is one of the most efficacious for ventilating the lungs, the sole difficulty being (as in all other manipulative methods) to insure the patency of the upper air-passages. This can easily be secured by tying in a catheter in the manner there described.

SOME REMARKS ON INFANT FEEDING.

DR. HENRY ASHBY states (*Medical Chronicle*, May, 1886) that it has been shown by recent researches that cows' milk is about four times as rich in casein as human milk, while the amount of salts is some three or four times as much, and the amount of sugar in human milk is half as much again as in cows' milk. The addition to cows' milk of water and sugar, with the object of approximating the various constituents to those of human milk, must necessarily fail as regards one or more of them. Moreover, the addition to cows' milk of lime water, barley water, or a fluid containing dextrin or some other gelatinous substance, does not, as is generally supposed, prevent the bulky coagulation *provided the fluid be left at rest*. On this account Dr. Ashby advocates peptonized milk. This may be readily prepared for infants by pouring four ounces of boiling water on four ounces of milk, adding one-fourth of one of Benger's peptonizing powders, two teaspoonfuls of cream, and allowing it to stand for ten or twenty minutes, according to the amount of peptonizing desired, then adding a teaspoonful of sugar or milk sugar, and letting the infant take it at once. When this form of food is administered, though some curd may appear in the stools it is always soft and passed without difficulty.

Another less expensive artificial human milk may be prepared by mixing one-quarter pint of cream with three-quarters pint of warm water and adding one-half ounce of milk sugar. To this two to ten ounces or more of milk may be added, according to the age or the infant's capacity for the digestion of curd.

Another artificial human milk may be prepared according to Meigs's formula by taking two tablespoonfuls of cream of medium quality, one of milk, two of lime-water, and three of water to which sugar of milk has been added in the proportion of seventeen and three-quarters drachms to the pint, which saccharine solution must be kept in a cool place and prepared fresh every day or two. An infant may take a half pint to three pints of this mixture, according to age. In round numbers, this artificial human milk may be said to contain eleven to twelve per cent. of solids, of which three or four per cent. is fat, one per cent. curd, and six to seven per cent. sugar.

Any one of the above forms of food will generally be found to agree well with a healthy infant, or when it is suffering from dyspepsia or intestinal catarrh.

GYNECOLOGY.

ON THE SUPPURATION AND DISCHARGE INTO MUCOUS CAVITIES OF
DERMOID CYSTS OF THE PELVIS.

From a carefully selected series of cases MR. G. E. HERMAN (*Obstet. Trans.*, vol. xxvii.) deduces the following conclusions as to the treatment of cases in which a pelvic dermoid cyst has opened into an accessible mucous cavity. Suppuration of a dermoid cyst is sometimes a favorable event, leading to its cure, more especially if the cyst is small and unilocular and if it has opened into the vagina. A dermoid cyst, originally very small, may, when it suppurates rapidly, attain a large size. When the cyst is small it may become inverted through the aperture of discharge, become polypoid, and be spontaneously expelled or easily removed by the surgeon. In some cases this process may be initiated by the surgeon. When a suppurated dermoid cyst has been emptied it contracts, and its cavity either becomes obliterated or remains as a small sinus which causes no trouble. Until the cyst has been emptied cure will not result, hence the first indication for treatment in a cyst which has burst is to empty it. The opening should be enlarged as much as can be safely done, the cavity explored, and its solid contents removed as completely as possible without injury to its walls. In case the cyst has discharged into the bladder its cavity should be reached by vaginal cystotomy in preference to dilatation of the urethra, as being a far safer and much more advantageous proceeding. If the cyst is multilocular, or if, after having been emptied as thoroughly as possible, it does not rapidly contract (from which it may be inferred that it has not been completely emptied), it is likely that it will discharge indefinitely and exhaust the patient's strength, and therefore it should be removed by abdominal section without delay.

ON SOME FORMS OF ENDOMETRITIS CORPORIS.

According to LÖHLEIN (*Berliner klinische Wochenschrift*, June 7, 1886) three forms of the disease exist, one *interstitial*, specially described by Olshausen, in which the connective tissue is largely infiltrated with cells, and overgrowth of the stroma is the essential feature; a second *glandular*, in which enlargement and multiplication of the glands is conspicuous; and, thirdly, a mixed form, specimens of which are often met with. Opponents of "*evidement*," or, as Löhlein prefers to name the procedure "*abrasion*," maintain that the most frequent form of hyperplastic chronic endometritis is neither macro- nor microscopically distinguishable from the condition of the mucous membrane shortly before menstruation; and, therefore, Löhlein lays special stress on the fact that all his preparations have been obtained either from cases of protracted bleeding, or soon after the end of profuse menstruation.

In reference to the treatment of the form of endometritis we are at present dealing with, Löhlein places in the first rank the removal of the overgrown mucous membrane by means of the curette. He guards himself expressly against the assumption that he holds this procedure to be generally indicated in every case of endometritis corporis. The bleeding is by this means

arrested more quickly, more reliably, and (when asepsis is employed) less dangerously than by intrauterine application of astringents or cauterants. In the majority of cases also its action is more permanent, for even if relapses take place, and make repetition of abrasion necessary, this is less to be apprehended from this than from any other treatment. The utility of the spoon compared to earlier methods is the more evident, and its success the more permanent in proportion as we have to deal with circumscribed alterations of the mucous membrane.

Touching on the need of care in the use of the curette, Löhlein remarks, "I never operate on a patient who is walking about, but make her keep her bed for two or three days, and not quit the bedroom for three more. If abrasion is necessary in a case where already acute or chronic inflammation has left behind residual exudations in the true pelvis; nay, in every instance where during or after the operation pain has been experienced I apply during the first twenty-four hours an ice-bag, and cold epithems for some days following. Respecting other precautions, needful to avoid unpleasant consequences, the possibility of an existing pyosalpinx, as well as of perimetritic and ovarian morbid processes, must not be overlooked. In such instances fixation of the uterus by forcibly drawing it down with forceps must be omitted; although usually by this means the special injury of the operation, viz., the repeated dragging on the ligaments during the movements of the spoon, is avoided. Scraping out is then only to be performed when the indication for it is urgent, and is to be made as little dangerous as possible by very steady movement of the spoon with counter-pressure on the uterus from the abdominal parietes."

Septic infection must, of course, be made impossible. No fear need be entertained that the operation will induce the formation of a cicatrix, and so destroy the extremely important agency of the mucosa corporis.

A controversy still exists (1) as to whether dilatation should precede the scraping out, and (2) whether an injection of liquor ferri should be made either immediately, or some days after the operation. In the majority of cases, in almost all women who have borne several children, dilatation is certainly unnecessary. On this head, gynecologists are now satisfied, following herein Schröder's lead. If the procedure is rendered necessary on account of real stenosis of the canal, the choice lies between division (dividing the walls of the cervix), gradual dilatation by cylindrical dilators (Hegar's hardened caoutchouc), and tents. Division by the knife is most advisable in those cases in nulliparæ, where chronic cervical catarrh coexists. Tents are completely avoided by some gynecologists, and the author also uses them very rarely, but he admits that they possess many advantages, especially in cases where a sufficient amount of assistance is not to be had; while the objection which previously attached to them on account of possible infection, can now be completely avoided.

Cauterization of the endometrium with liq. ferri after scraping he has known to produce in some women most torturing pains, in one instance a limited perimetritis; since he has abandoned its use altogether, his results have been quite as good as previously, but though he holds generally that abrasion is the only reliable remedy in cases of hyperplastic endometritis, yet under special circumstances injections of liq. ferri deserve the preference. Such are cases

of fibroid not accessible at the moment to enucleation, and those of hyperplastic endometritis hæmorrhagica. Löhlein does not deny altogether the value of drugs in dealing with this disorder. In cases where the growth of mucous membrane elements and losses of blood are moderate, the use of ergotine, and, according to his recent experience, still more of extract of *hydrastis canadensis*, is of notable value; he gives both drugs chiefly during the last eight days before the catamenial flow, and also for the most part during the period; and he has received from a good many reliable females affected with chronic hyperplastic endometritis positive statements that the duration of the flow had been reduced, especially by *hydrastin*, from nine or twelve days to five or six. Some of these had previously undergone abrasion, others had not. He has not yet observed any cases of such obstinately occurring hemorrhage in pure chronic endometritis as to compel him to resort to total extirpation of the uterus.

One point must not be omitted in the treatment of these cases, viz., to regard heedfully any existing complications. If we facilitate the return of venous blood by correcting uterine displacements, by promoting the resorption of existing parametritic and perimetritic exudations, by preventing fecal accumulations, and by a due regard to existing disorders of the respiratory and circulatory apparatus, we do very much to benefit these patients.

As regards the second of the above mentioned forms of endometritis, the exfoliative, the author speaks shortly.

The relative frequency of previous inflammation within or around the uterus is in every way remarkable. This circumstance is certainly not to be neglected in the treatment of the disorder. Like others, he is quite satisfied that the curette is no more capable of thoroughly and permanently removing the evil than the intrauterine injections which were formerly employed. The results of abrasion are, however, more permanent if the existing hyperæmia of the entire organ, the residues of inflammation in its vicinity, and any dyscrasic conditions that may be present are duly regarded and dealt with.

In this, as in so many other morbid states of the internal female genitals, the law holds good that a diseased action is rarely limited to a defined district, and that mucous inflammations are especially prone to creep upward, and, if at all of long duration, to involve the parenchyma and the appendages.

ON CASTRATION IN CAVERNOUS MYOFIBROMATA OF THE UTERUS.

A case of this kind has been recorded by Schleich in his dissertation on this subject where complete recovery was the result of the operation of castration performed by Prof. Saxinger. DR. GOLDENBERG publishes a second which occurred in the obstetrico-gynecological clinic of the Academy of Medicine in St. Petersburg.

In the treatment of this case a radical operation seemed clearly indicated. The choice lay between castration and hysterectomy. The recognized great dangers of the latter procedure appeared in this case, where the patient was so debilitated, yet more serious, and likely even to cause death. Castration was, therefore, performed, (1) as the less dangerous operation; (2) as having so many times produced favorable results, in ordinary fibromata, especially (3) on the ground of the case of Prof. Saxinger, in which the influence of

castration in bringing about the menopause, and disappearance of the cavernous tumor, was most strikingly evidenced.

Castration was accordingly performed by Prof. A. J. Lebedeff, on January 20, 1885. For six weeks after the operation there occurred repeated, irregular, comparatively slight losses of blood, then complete menopause. The tumor gradually shrunk, and on dismissal of the patient six weeks after the operation was only of the size of the head of a six months' fetus. Health was completely regained at home. Only at three periods slight molimina occurred without any trace of discharge of blood.

We have thus two operations performed under like circumstances and with similar success. Though the value of castration may have been disputed by several authors on theoretic grounds, yet all objections to it fade away before the statistics compiled by Wieder, which justify us in regarding castration as the operation to be preferred in uterine fibromata. And if this is the case in ordinary uterine fibromata, it appears to be of still greater value in cavernous myofibromata, since in the latter we have not only to deal with an isolated tumor, but with a diseased state of nearly the whole uterus, and the connection of the whole train of symptoms with menstrual congestion is most clearly apparent. Thus the fact that the climacteric anticipated by the removal of the ovaries can induce the menopause and disappearance of the tumor obtains in the above two cases of cavernous uterine fibromata a still more brilliant realization than in ordinary fibromata; and further justifies us in recognizing this experience as an important proof that menstruation is dependent on the activity of the ovaries; and that castration, especially in cavernous uterine fibromata, is to be estimated as the fittest operative procedure without regard to the size of the tumor, the age, and general condition of the patient.

ON THE INDICATIONS FOR THE SITE OF THE OPERATION IN CANCER OF THE CERVIX UTERI.

M. HOFMEIER (*Berliner klinische Wochenschrift*, 1886, vol. xxiii. p. 91,) holds that from a study of the recorded operative results it clearly appears (1) that partial extirpation in many cases of cancer of the cervix, especially in most of those submitted to operation, is sufficient; (2) that it is less dangerous, to a not inconsiderable extent. The eminently practical and important question follows: For what cases is the partial operation sufficient, and what is the total requisite? A decisive answer to this question is given in the anatomical relations of the various forms of cancer, as they are laid down in Ruge and Veit's work based on very ample material. (*Zeitschr. f. Geb. u. Gyn.*, vol. vi. and vii.) Without going into this question more minutely, it will suffice to repeat shortly that three forms, extremely different in their anatomical relation, may be distinguishable, viz., (1) caneroid of the portio vaginalis, (2) cancer of the cervical mucous lining, (3) cancer beginning as nodules in the tissue of the cervix, and making its way to its inner or outer surface. The author's selection of the operation about to be performed has been governed by the above anatomical data; in cancer of the portio vaginalis he performed partial, in cancer of the cervical mucous membrane and cervical tissue total extirpation. The results are given in tabular form.

From the nature of the thing, and partly from the coarse anatomical rela-

tions it comes to pass that cancrroids of the portio vaginalis are far more frequently operated on, because they are generally more easily diagnosticated. As they come prominently forward, and are more exposed to traumatic influences symptoms occur proportionately early which call for medical aid. But it is generally sought too late. Cancers of the mucous membrane of the cervix, which mostly appear as ulcerations, and herein are on the whole forerunners of cancer of the body of the uterus, run their course much more latently, and often do not produce symptoms until they have already destroyed the whole substance of the cervix. It is, therefore, certainly true that they are rarely diagnosticated in the early stage; but that they are never diagnosticated, as Jackson maintains, is false. When they are met with in some measure in an early stage they offer apparently a very good prognosis as regards the definitive result. All the cases in which after total extirpation a long enduring cure was noted belonged with one exception to this form of cancer. They resemble in this respect also cancers of the body, which, if operated on tolerably early, afford a very good prognosis. One is certainly not wrong in seeking the cause of this in the anatomical condition of the uterus, which, as a sharply bounded, isolated organ with firm muscular walls, opposes a positive and insuperable barrier to ulcerating cancer.

Very much more unfavorable in this respect is evidently the third form, viz., cancerous nodules in the cervical tissue. Symptoms do not set in here until ulceration has commenced, that is, when the cancer has already existed for a long time. Here total extirpation is usually necessary, because the cancer often extends far into the uterine tissue, and can no longer be entirely removed by a partial operation. The prognosis in these cases appears to be absolutely unfavorable. Most of the relapses after total extirpation occurred under such circumstances.

Thus the indications for the different operations are quite precise, and, according to Hofmeier's experience, we are almost always able, after an accurate vaginal or rectal examination during narcosis, to form a correct idea of the form of cancer in the case before us, and there to choose our operation. If this cannot be done the cancer, as a rule, has produced great destruction, and it is best to give up all idea of a radical operation. The greatest difficulties in diagnosis are occasioned by the ulcerated nodules originating in the tissue of the cervix, because it is often hard to get information respecting the upward extension of the cancer, as well as concerning the degree in which the cervical mucous membrane is involved. In such cases the more radical operation should be preferred; though even then the outlook as regards relapses is very unfavorable. The author appends here a perfected list of his operations from October 1, 1878 to January 1, 1885, which shows on the most cursory inspection how many patients who survived the operation remained healthy after the lapse of one or several years.

During the period mentioned, viz., up to a year before the publication of this work, 105 partial extirpations were performed, of which 10 died. The subsequent destiny of 7 more remains doubtful, among them 1 who died of an acute disease in the first five months. Relapses (fatal) occurred in 43 within the first year. After the first year 45, or fifty-one per cent., remained sound. The table also shows in the most manifest manner that we may regard those who remained sound up to the end of the first year as pretty certainly

cured, at least of uterine cancer, for out of all who remained under observation over a year only 4 had local recurrences. Moreover, in these the local condition was very suspicious before the lapse of a year, so that an earlier date might certainly be assigned to the relapse. We are probably more justified in this than in any other operation undertaken on account of cancer in considering the patient as definitely cured when she has reached the end of the second year consecutive, though, of course, this rule is not without exceptions. Later than two years these local recurrences in this form of cancer do not occur, as is the case also in total extirpations, when most relapses appear before this date.

Thus the selection of this time-point seems very fitting, and if we apply this scale in order to compare the result of partial with those of total extirpations, we get the following outcome: Of 83 cases treated by partial extirpation of the uterus from October 1, 1878, to December 31, 1883—*i. e.*, up to two years ago—68 come before us for consideration. Of these, 31 remained sound, while 37 suffered from relapses, but only 4 in the course of the second year. The author remarks here expressly, that only in 2 of those who had recurrences in the first year after the operation did total extirpation appear indicated on the occurrence of the relapse, which implies that in these instances the disease had propagated itself to the uterus, while in others the pelvic connective tissue was always affected. Reviewing, now, how things went in the total extirpations: during the same term there were 40 operations performed, with 10 deaths. Of the 30 survivors, the result was doubtful in 1 who emigrated to America. Relapses occurred during the year in 15 of the operated, the subsequent fate of the remaining 14 is shown in a table. It appears from this that of 29 cases which have to be considered in estimating the permanent value of the operation, 15 up to a year ago had relapses in the first year, and 14 at the same date were sound. Unfortunately one cannot affirm that of these cases that after the first year the chief danger of relapse was over, for of these 14 no less than 7 had relapses in the second year.

The cause of this difference between the subjects of the two operations lies certainly in the different form which the cancer presented. It should be specially noted that the patient in whom the cure lasted longest had a commencing cancer of the portio vaginalis. In her, on account of suspected extension of the disease to the uterus, total extirpation was performed, while a partial operation would surely have obtained the same success. If thus we take the end of the second year as the measuring date for the eventual efficacy of the operation, the result will be as follows: Of 35 operated on two years ago 9 died; 1 has disappeared. There remain 25 cases, in 19 of which relapses occurred up to the end of the second year, while 6 remained sound. This gives a percentage of 24 for total extirpation. The corresponding figure for partial extirpation is 46. To conclude from this that total extirpation is superior to vaginal is impossible. But it would be just as wrong to affirm that because partial extirpation has given so much better results than total, the former alone is justifiable. The great majority of the cases which have been treated by total extirpation could not have been dealt with by partial. Without doubt, an operation for cancer is justified which renders twenty-four per cent of its subjects sound for several years, while no other radical operation is a possibility.

Since the essential object of this inquiry is to examine what method of operation succeeds best in freeing a patient from her uterine cancer we do not need to consider the recurrences taking place at a late period after operation elsewhere than in the uterus, the so-called regional recurrences. For even total extirpation can only remove the organ itself, but not the lymph glands lying at a distance. Recurrences, therefore, which occur years after operation, the uterus itself remaining healthy, are preventible by no operative procedure. And of this kind have been all the recurrences which were observed later than a year and a half after partial extirpation. In 2 cases (12 and 14 of Table II.) the patients operated upon were under direct clinical observation, of the third a medical report was given, in two other instances (28 and 29) the results of dissection showed that No. 28 died of a great carcinomatous tumor of the pelvis destroying the hip-joint, while the uterus remained quite sound three years after the operation. The second died after an equally long interval, of cancer of the ovary and pelvic connective tissue with similar exemption of the uterus. These two dissections prove that the operation had completely attained its immediate aim, viz., cure of the uterine cancer. View the later recurrences as we will, they did not start from the stump of the uterus, which continued healthy. Therefore, it would have availed the patients nothing if they had, at the outset, been subjected to total extirpation.

The result of the whole inquiry is, that the largest number of patients affected with uterine cancer who come for treatment may, with regard to permanent success, be treated by partial extirpation. Where this is insufficient, total extirpation must be performed, so long as it offers any prospect of success, since by its means cases otherwise desperate may still be rescued. The prognosis of cervical carcinoma compares favorably with that of cancers in other parts, as given by surgical authorities, inasmuch as out of ninety-three cases operated on for this disease up to two years ago, thirty-seven, or 40.2 per cent., remained sound at least two years after the operation.

The best chances for a radical cure appear to be offered by cancroïds of the portio vaginalis, if they can be operated on at all early; they exceed in this respect even the lip cancer.

DR. BRENNECKE, in reply to Dr. Hofmeier (*Ibid.*), maintains that total vaginal extirpation in cancer of the neck of the womb is, under all circumstances, more useful than partial, without being in the least more dangerous; for (a) it averts the eventually threatening dangers of the uterine stump; (b) it affords undoubtedly the greatest guarantee against local recurrence; (c) as regards safety, compared with partial extirpation it leaves nothing to be wished for.

ON EXTIRPATION OF THE ENTIRE UTERUS.

Before entering into the justifiability of this operation, DR. W. A. DUNCAN (*Obst. Trans.*, vol. xxvii. p. 8) brings into comparison the results obtained by the abdominal and vaginal methods in the hands of various operators. Out of 137 cases of abdominal extirpation, 99 deaths occurred; whereas, out of 276 cases of vaginal extirpation, there were 79 deaths, thus giving a death-rate of 72 per cent. for the former as compared with 28.6 per cent. for the latter method. Hence, unless there be some special contraindication, the vaginal method should be adopted.

In the performance of this operation, Dr. Duncan makes the following suggestions: First, that when practicable the vessels of the broad ligament should be ligatured as recommended by Schröder, instead of being permanently clamped with forceps as proposed by Sir Spencer Wells. Second, that closure of the peritoneal cavity with sutures is an unnecessary proceeding, from the fact that the bladder, even when empty, falls down on the posterior vaginal wall and contracts adhesions with it, and is sometimes injurious from the risk of wounding the ureters in the attempt. Third, that the insertion of a drainage tube and plugging the upper part of the vagina are injurious, from the fact that they prevent the shutting off of the peritoneal cavity by natural processes. On the other hand, he advocates that the patient be well propped up in bed so as to keep the wound closed by the pressure exerted by the intestines on the bladder and also to facilitate the escape of any exuded fluid into the vagina.

After pointing out the various conditions for which this operation has been performed, he concludes that in cases of malignant disease alone is this operation ever justifiable. And, moreover, it is only in some cases of cancer of the body of the organ that total extirpation is called for. In all cases of cancer affecting the portio vaginalis, and *à fortiori* when there is the least implication of the vaginal walls, total ablation of the uterus, from its immense immediate risks, is an unjustifiable proceeding, when quite as good ultimate results may be obtained from an operation—*i. e.*, supravaginal amputation—the immediate risks to life from which are four times less.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

UNDER THE CHARGE OF
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THREE CASES OF INJURY OF THE HEART.

DR. SCHULTE, of Hörde, reports three such cases (*Viertelj. f. gerichtl. Med.*, 1886, N. F., Bd. xlv. S. 308-311). They do not present any striking peculiarities, but they are all cases in which there was little or no bleeding externally, and where the blood escaped solely into the pericardial cavity. Accordingly death was not the result of loss of blood, but of pressure of the blood on the heart. The first case was that of a man, *ætat* fifty-three, who was found dead after an adulterous visit to a married woman. There was no external injury. The pericardium was found to be distended with about 800 c. cm. (28 ounces) of partly coagulated blood. The auricles and ventricles were quite empty. The semilunar valves of the aorta were not quite competent. At the back of the *bulbus aortæ*, within the pericardium, there was a cross rupture of the wall of the bulbus, half an inch in length. The aortic wall was thin and in part of a yellowish color internally. It could not be shown whether the rupture was the result of psychical excitement, or whether

it was owing to a violent tussle with the woman's husband, or whether it was merely the result of accident.

The second case was that of a middle-aged man, who in the course of a quarrel received two revolver-shots in the breast. On the left side of the breast were found two bullet wounds, four inches apart, one of which passed through the cartilage of the fifth rib, close to the sternum, the other having penetrated the fourth intercostal space. The bullet was found close behind the perforated cartilage; the other (both were 7 mm. in diameter) was found with its base sticking in the anterior wall of the greatly distended pericardium, which contained about 600 c. cm. (21 ounces) of blood. There was no serious effusion of blood elsewhere in the chest. The heart was empty, and the anterior wall of the left ventricle, near to the apex, was penetrated by a wound, 5 mm. in diameter, which opened on the inside of the ventricle beneath a papillary muscle, and thus was partly closed by it. The bullet found fixed in the pericardial wall had caused the wound in the heart, but had prevented the blood escaping from the pericardial cavity. The person lived for half an hour after receiving the injury.

In the third case, a man, æt. 20, was stabbed in the breast with a table knife in the course of a quarrel. He walked about fifteen steps, and then fell down dead. The wound, two inches in breadth, was found to penetrate the fifth intercostal space, near to the left side of the sternum. The left pleural cavity contained about two ounces of blood. The pericardium was distended with 600 c. c. (21 ounces) of partly coagulated blood. There was a wound, fully one inch in length in its anterior wall, as it lay against the sternum. The edges of the wound were close together and very little blood had escaped. The heart was empty, and there was a wound, about an inch long, in the anterior wall of the right ventricle.

MURDER OR SUICIDE?

FREYER, of Naugard, reports a case (*Vierteljahrsschrift f. gerichtl. Med.*, 1886, N. F., Bd. xlv. S. 45-51) in which he was asked by the authorities to give an opinion. The physician who made the autopsy, stated that he believed the case to be one of suicide. The circumstances were these. A young woman, æt. twenty-five, was engaged to be married to a neighboring peasant's son, who does not appear to have had a high character. The engagement was distasteful to the young man's parents, because the woman was poor; but she would not allow the engagement to be broken. On the 30th of March she proceeded to a neighboring village to have a tooth extracted. On her return homewards, at six in the evening, she had to pass a wood, near which were working the young man and his father. Both these were seen about this time to leave their work and enter the wood. The young woman from this time was missing. Four days later, her dead body was discovered, one and three-quarter miles from the wood, in a deep gravel-pit filled with water. The body stood upright on the steep bank of the gravel-pit, with the top of the head one foot under the surface of the water. The body was fully clad. The head and neck were enveloped in a shawl. The hands rested on the front of the abdomen, and grasped the apron in which her shoes were wrapped. The stockings were not covered with mud or earth. One ear-ring was wanting and appeared to have been torn out. At the autopsy, which was made two days later,

it was found that rigor mortis had not entirely disappeared. *Cutis anserina* was noticeable in some parts of the body. On the neck, the inner side of the thigh, and the middle of the back, there was a brownish-red discoloration, but no subjacent effusion of blood. On the neck, beneath the larynx in front, and the second vertebra behind, a grayish-blue line one-quarter to one-half inch in breadth was observed passing round the neck, and was double in front. The skin was not hardened, nor did the subjacent tissue contain excess of blood. The heart and veins were distended with dark blood. The lungs almost filled the pleural cavities, after removal of sternum. The left of these cavities contained two ounces of a reddish fluid, the right fully three ounces. The lungs were partly adherent to the ribs, and their surface was of a marbled reddish-brown color. They were soft and crepitant. On section, a tolerably large quantity of dark blood, mixed with air-bubbles escaped. A fine brownish-red froth could be freely pressed out of the lungs. The mucous membrane of the bronchi and trachea was covered with a fine frothy reddish mucus. Trachea reddish and empty. Stomach contained twelve ounces of pure whitish fluid mixed with many air-bubbles. Uterus unimpregnated. Based on these appearances, the physician who made the autopsy certified that drowning was the cause of death, and that the case was probably one of suicide. Freyer, however, thinks otherwise. He believes the case to have been one of homicidal strangulation or hanging, the body having been afterward placed in the water. On the authority of Maschka, Hofmann, and Lesser, he denies that the presence of a little fluid in the lungs and stomach is diagnostic of death by drowning, as Lesser has shown that water can penetrate to the extent of several hundred cubic centimetres into these organs after death, if the body is placed in water. He also notes that the lungs were not "balloon-like," and had not the spongy feeling which waterlogged lungs have, and that the fluid which escaped on pressure was not watery. He attaches no importance to the *cutis anserina*. He supports his own opinion of the mode of death by reference to the erect position of the body in the water which he accounts for by the body having been placed in the water after it became rigid; also by reference to the mark on the neck, accompanied by hyperæmia of the brain and lungs, and reddish frothy mucus in the trachea and bronchi, and finally to the ear-ring having been torn out. He believes that the apparent double course of the ligature in front of the neck, along with the general circumstances, point to strangulation having been practised, rather than hanging.

CASE OF ALLEGED INFANTICIDE.

KOB, of Stolp (*Viertelj. f. gerichtl. Med.*, 1886, N. F., Bd. xlv. S. 87-95), criticises a case where a young maid-servant was charged with having destroyed her newborn child. The main interest of the case attaches to the peculiar nature of the injury to the child. The cutaneous and muscular tissues of the left cheek extending from an inch behind and below the left ear to the left angle of the mouth were completely torn through and covered with coagulated blood, as was also a portion of the right cheek at the right angle of the mouth. The lower jaw was broken through at its middle, and the whole buccal cavity was quite exposed. The lower part of the tongue was almost completely torn through; there were some nail marks on the neck. The girl stated that these injuries were inflicted during an effort that she

made to separate the child from her body, by grasping the head after the head had been born. She had concealed her pregnancy, and she wished, if possible, while still retaining her situation as servant, also to conceal the birth. The lungs of the child floated in water. The umbilical cord was unbroken, and the placenta was attached to it. Kob saw no reason to doubt the girl's statement. A similar case is recorded in Maschka's *Handbuch der gerichtlichen Medicin*.

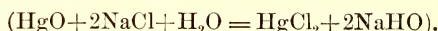
ANTISEPSIS IN RELATION TO LEGAL RESPONSIBILITY.

In all civilized countries the law holds a physician criminally responsible when, by the neglect to use reasonably proper means to cure his patient, the patient dies; and charges of alleged malpractice are not infrequent in the criminal courts. Laying aside differences of opinion on fine points, which will always exist, the medical profession is fairly well agreed as to the main lines of treatment, or of operative interference, in many forms of injury or disease, and would regard any ignorant and unjustifiable departure from these lines as constituting malpractice. The value of the antiseptic method of surgical treatment is now so universally recognized, although in its modern form it is of quite recent origin, that the administrators of the law are now forced to consider seriously whether the neglect of antiseptic precautions in the treatment of injuries is not to be regarded as criminal, if the injured person die apparently from such neglect. With the object of helping to solve this question, DR. CARL DENEKE, of Flensburg, contributes an article to the *Viertelj. f. gerichtl. Med.*, N. F., xxv. S. 96-115, in which, after considerable discussion of the subject, from many points of view, he arrives at the following conclusions: (1) It is to be regarded as a case of criminal neglect if a surgeon neglects the principles of the antiseptic method in the treatment of injuries or of operative wounds, unless the fulfilling of some vital indication renders adherence to these principles impossible. In illustration of the cases excepted, he mentions the possibility of a surgeon being engaged in brushing a diphtheritic throat, when he is suddenly called to an accident in a neighboring house, where he finds a boy fast bleeding to death from a tear, by a threshing machine, of the thigh, involving the femoral artery, from which the blood is seen to be spirting. His immediate duty is to stop the bleeding by closing the end of the artery with his forceps, although neither his hand nor the forceps has been previously washed. (2) The surgeon who treats a wound or injury according to the approved methods of antiseptic procedure is not to be held responsible in a court of law for any unfavorable course the wound may take. (3) In cases where complaints are lodged against surgeons on account of alleged want of skill in the treatment of wounds, the legal authorities ought, in the course of their preliminary investigation, to submit the case to a medical faculty for its opinion.

THE CHANGES WHICH THE DIFFERENT MERCURIAL SALTS UNDERGO IN THE ORGANISM.

FLEISCHER, of Erlangen (*Deutsche med. Wochenschrift*, xi. 36), finds, in agreement with the result obtained by Fürbringer, that calomel, when applied externally to moist surfaces, is converted into a soluble compound, whose stimulating action accounts for the healing effects of calomel when used

locally. He also observed that, if calomel is added to a solution of chloride of sodium, the filtrate is muddy from the presence of reduced metallic mercury, and gives a reaction with stannous chloride. If digested for some time and evaporated and extracted with ether, the filtrate yields crystals of what appears to be corrosive sublimate. The author has therefore no doubt as to sodic chloride acting on calomel to form corrosive sublimate, but he believes, and gives experiments in support of his belief, that the corrosive sublimate is formed, not by the taking of chlorine from the sodic chloride, but by the splitting up of the calomel into corrosive sublimate and metallic mercury. The author confirms, by experiments on cats, Schläefke's statement that calomel dusted on the conjunctiva becomes yellowish-green, and the conjunctiva inflames if iodide of potassium has previously been administered internally. He also finds that mercuric oxide, after long contact with sodic chloride, forms mercuric chloride, the fluid becoming strongly alkaline from the presence of caustic soda,



This explains the caustic action of mercuric oxide when applied locally.

COAL-GAS POISONING.

WARFVINGE (*Hygiea*, xlvii. 3 *Svenska läkaresällsk. förh.* p. 9, 1885; reported in Schmidt's *Jahrbücher*, Bd. 208, S. 132) gives an account of eight cases of poisoning by coal-gas in houses where there was no gas supply. The persons lived together on a ground floor. They perceived an odor of gas in the house on retiring to bed, but nevertheless went to sleep as usual. They were all found senseless in the morning. They all recovered—five quickly, and the remaining two after a few days of hospital treatment. The ground was frozen at the time, and Warfvinge attributes the presence of gas within the house to its escaping from a broken gas-pipe in the neighborhood of the house, and to its being prevented from rising up through the soil in the usual manner by the frozen ground. Heymann, who criticised the paper after it was read, believes, on the other hand, that the escape of the gas into the house was mainly due to the difference in temperature between the outside atmosphere and that of the house. The gas was in this manner sucked into the house through the ground. He has found by experiment that frozen soil previously moistened is just as pervious to gas as is unfrozen soil.

TOXIC ACTION OF THE LOWER FATTY ACIDS.

HEINRICH MAYER has published in the *Archiv f. exper. Path. u. Pharmak.*, 1886, Bd. xxxi. S. 119–137, the results of an investigation, under the direction of Binz, of Bonn, of the action of the lower fatty acids. This forms a continuation of his work on trichloroacetic and trichlorobutyric acids, which has appeared in the same *Archiv*. He finds (1) that, in comparing the action of the sodium salts of trichloroacetic and trichlorobutyric acids with those of the non-chlorinated fatty acids, motor paralysis is a prominent and early feature in the action of the former, the sensorium being attacked later; whereas, in the case of the latter, the sensorium is more prominently affected, and motor paralysis is only feebly developed. (2) That the sodium salt of trichloroacetic acid has an energetic paralyzing effect on the nerve-centres, whereas the

sodium salt of acetic acid is not more poisonous than chloride of sodium. (3) That, on the other hand, the sodium salt of trichlorbutyric acid has a more feeble action than the sodium salt of butyric acid itself, which exercises a powerful paralyzing effect. (4) That, as regards the salts of the simple fatty acids—formate, propionate, butyrate, and valerianate of sodium—they produce, when subcutaneously injected in cats, drowsiness passing into sleep, coma, and its accompaniments. These symptoms are induced by a dose which, in the case of acetate of sodium, and lactate of sodium, has no action whatever. (5) If formic acid be excluded, which, on account of its aldehydic character, behaves somewhat singularly, all the other fatty acids have their toxic action increased with an increase in the amount of the contained carbon. In point of toxicity, formic acid lies between butyric acid and valerianic acid. These experiments were made on dogs and cats.

THE CAUSE OF THE TOXIC ACTION OF CHLORATE OF POTASSIUM.

Under this title, STOKVIS, of Amsterdam, contributes a lengthy paper to the *Archiv f. exper. Path. u. Pharmac.*, 1886, Bd. xxi. S. 169–218. The contribution is partly experimental, partly critical. The experiments are tolerably numerous, and appear to have been carefully made. The author first investigated the reduction of chlorates within the living organism as tested by estimating the amount of excreted chloride and chlorate in the urine. He then observed the action of organic and organized substances and animal fluids (including blood and urine) on chlorates outside the living body. He next investigated the formation of methæmoglobin in the blood of the living body under the action of chlorates. And, finally, he considers the cause of the toxicity of the chlorates. He obtained practically negative results, and concludes that a salt of chloric acid is not more poisonous than a salt of hydrochloric acid—*e. g.*, he found that chlorate of sodium is quite as innocuous as chloride of sodium when injected into the blood, or when administered by the mouth. He therefore ascribes the toxicity of chlorate of potassium, not to the chloric acid, but to the potash. Potassium chlorate is poisonous, therefore, for the same reason as potassium nitrate, or any other salt of potassium. His conclusion appears to be well founded. It is not, however, altogether novel.

EFFECTS OF DRASTIC POISONS ON THE INTESTINAL TRACT.

LUCIEN BUTTE (*Annal. d'hyg. publ.*, ser. 3, t. xv. pp. 347–364) has made an experimental study on dogs of the effects of colchicine, veratrine, croton oil, and colocynth on the intestinal tract. The substances were administered both by the mouth and subcutaneously, and always in sufficient dose to kill the animal. His conclusions are as follows: All the drastics employed produce inflammation and ulceration of the intestines; but they differ as to the degree of inflammation, and the seat and form of the ulcerations produced. Colchicine and veratrine both cause hyperæmia of the intestinal mucous membrane; but that caused by the colchicine is more intense and more widespread than that produced by veratrine, and there are several submucous ecchymoses, and the enteritis occupies three-fourths of the small intestine. In the case of veratrine, the enteritis hardly extends beyond the duodenum. The ulcerations resulting from colchicine are small and well defined, while those

from veratrine are larger and ill-defined, and are elevated at the centre. In the case of both, the large intestine is only slightly inflamed. Where croton oil had been used, the enteritis was very pronounced, and the submucous ecchymoses were very large and prominent; on the other hand, the ulcerations were very small and superficial. The large intestine was free from inflammation. Colocynth causes a slight congestion of the duodenum, with some small superficial ulcerations. The rest of the small intestine is not reddened. But the large intestine is violently inflamed with elevated longitudinal bands or streaks, of a dark red or blackish color.

THE STATE OF THE CORPSE AFTER POISONING BY ARSENIC.

PROF. ZAAIJER, of Leyden (*Vierteljahrsschrift für gericht. Medicin*, 1886, N. F., Bd. xlv. S. 249-277), records the results of the medico-legal investigation of an unusually atrocious series of cases of poisoning by an artisan's wife (Frau Van der Linden) in Leyden who, rivalling even Tofana and Brinvilliers, appears, in the course of a few years—from 1869 to 1883—to have poisoned and attempted to poison with arsenic no less than seventy individuals, of whom twenty-three or twenty-four died, including her father, her mother, and her son. The corpses of sixteen of them were exhumed and examined by Zaaier, with the assistance of Dr. Koning and Professor Van der Burg. From the scientific standpoint, the author's attention was mainly directed to the progress of putrefaction in the exhumed corpses, especially to their mummification. And, in order to add weight to his conclusions, he collected and compared the published accounts of sixty other cases of arsenical poisoning, in which the dead body was examined either before or after burial. He concludes—and his conclusions are not confined to arsenical bodies—that the bodies of very young children putrefy more quickly than those of adults, and especially of old people. Sex has no influence. Fat, corpulent, lymphatic bodies putrefy more readily than thin and lean bodies. Persons who have died of an acute disease putrefy more quickly than those who have died of a chronic disease. But if healthy men die suddenly they putrefy slowly. There are, however, many individual exceptions to be met with. After certain acute diseases, putrefaction advances very rapidly—*e. g.*, after septicæmia, smallpox, typhus, etc.; on the other hand, cholera corpses putrefy slowly, evidently owing to their containing little fluid, and to the emptying of the stomach and intestines. Poisoning by carbonic oxide, sulphuretted hydrogen, narcotics, prussic acid, and morphine, hastens putrefaction, as do also the various forms of death by suffocation. Poisoning by alcohol, corrosive sublimate, arsenic, potassium cyanide, thymol, chloride of zinc, and chloride of antimony hinders the progress of putrefaction. Dropsical bodies putrefy very quickly. He discusses also the effect of the atmosphere, temperature, moisture, clothing, coffin, and the grave on the decomposition of the body. This author recalls eight cases in his experience, where, by the end of six years, the soft parts of the corpse had almost entirely disappeared. In only one of these cases was arsenic absent. As regards the occurrence of mummification, he formulates the following conclusions: (1) Mummification of dead bodies is of frequent occurrence. (2) Arsenic-free bodies, under the same conditions as arsenic-containing bodies, resist putrefaction equally well with the latter, and mummify as readily. (3) The relatively frequent mummification of the thoracic and

abdominal walls, of the skin round the joints of the hands, knees, and feet, and of the skin of the hands and fingers, is easily explained, apart from the influence of arsenic. (4) There exists no so-called arsenical mummification. (5) Mummification is from the medico-legal and toxicological standpoint of no importance.

INJURY TO THE HEAD.

JAUMES (*Annal. d'hyg. publ.*, ser. 3, t. xiv. p. 555) reports the case of a man thirty years of age, who, in the course of a quarrel, received a blow on the left side of the head from a stone. The man complained at the time of the injury, but was able to continue his usual occupation for the rest of the day, and to go to the theatre in the evening. On his return from the theatre, however, he died in a few minutes. At the autopsy it was found that there was a depressed fracture of the squamous portion of the temporal bone, with rupture of the posterior branch of the middle meningeal artery, and contusion (with hemorrhagic spots) of the subjacent portion of the brain. The injury had not been of itself sufficient to cause immediate death, but the blood, escaping from the ruptured artery had gradually accumulated and produced a fatal compression of the brain. The interesting point in the case is the light character of the symptoms which immediately followed so grave a cranial injury.

PUBLIC HEALTH.

UNDER THE CHARGE OF

SHIRLEY F. MURPHY, M.R.C.S.

MILK INFECTION.

For some years evidence has gradually been growing which tends to show that outbreaks of infectious disease amongst milk drinkers have been due to milk which did not receive its infection after leaving the cow; this is especially true where the human disease has been scarlet fever and diphtheria, and, though less frequently, enteric fever. The fact that on a number of occasions it has been found impossible to show by what means this infection has taken place, has raised a considerable presumption that the cow herself must be responsible for this condition of milk; nevertheless such examination of the cattle as has been made has failed to indicate any affection of these animals which may be regarded as a possible source of infection. Recently, however, an outbreak of scarlet fever occurred amongst persons receiving their milk supply from a farm situated in Hendon, Middlesex. This outbreak was the subject of investigation by local medical officers of health, Mr. Wynter Blyth, of Marylebone, London; and Dr. James Cameron, of Hendon, as well as by Mr. W. H. Power, Medical Inspector of the Local Government Board, England. The official report by the latter gentleman has not yet been published, but the evidence contained in the reports of the local officers shows definitely

that milk from this farm was the cause of disease, and it is probable that a vesicular disease, which was found on the udder of the cows on the farm, was the source of its infection.

An interesting account of the cow disease has been presented by Dr. James Cameron, to the Epidemiological Society, and, although the evidence which will prove its relation to the milk infection will not be published until Mr. Power's report is issued, the subject is one of so much importance that Dr. Cameron's account will be read with deep interest. He stated that the disease is not a new one, it has been known to some farmers and cowkeepers at any rate as a catching malady under the designation of sore teats, blistered teats, and the like, but it has never hitherto been recognized or described as a specific contagious disease amongst cows, or considered to have any concern with the causation of scarlet fever in the human subject; it has commonly been regarded as a malady of little importance. The disease first appeared in some newly purchased cows which had arrived on the farm about a fortnight before the first cases of scarlet fever occurred among consumers of the milk. It was subsequently ascertained that one of these cows, which was the first sufferer, introduced the disease into the herd, the malady spreading from shed to shed until the whole herd of 100 cows, with very few exceptions, was attacked, while coincidently with the spread of the disease among the cows in the various sheds, scarlet fever made its appearance and continued to prevail among the consumers of the milk procured from these sheds.

The disease occurs usually in the first instance amongst newly calved cows, and is capable of being communicated to healthy cows by direct inoculation of the teats with virus conveyed by the hands of the cowman. The disease may continue from four to six weeks, and is characterized by general constitutional disturbance, a short initiatory fever, a dry hacking cough, sometimes quickened breathing, sore throat in severe cases, discharges from the nostrils and eyes, an eruption on the skin round the eyes and hind quarters, vesicles on the teats and udder, alteration in the quality of the milk secretion, and well-marked visceral lesions.

With regard to the eruption on the teats and udder, from five to seven days after the commencement of the illness, one or more teats become much swollen, and vesicles or bullæ shortly make their appearance upon them; these vesicles are usually rubbed and broken in milking, leaving sores with raised, ulcerated-looking edges; at this period the disease appears to be easily conveyed to other cows. Shortly after the vesicle has been broken, a brown scab forms upon the sore, and this may remain from ten days or a fortnight to five or six weeks, a thin discharge escaping from beneath it until the sore is healed. There is a tendency for the milk to become ropy during the illness, but this condition is not always present, and, as a rule, is not apparent until the milk has stood for five or six hours, hence the milk from this farm was distributed before this peculiarity had time to show itself.

Dr. Cameron concluded with the following practical recommendations and conclusions:

1. That all newly calved cows, which suffer from any undue constitutional disturbance after calving, should be at once removed from the milk business until completely restored to health.

2. That any cow developing symptoms of this particular cow disease should be at once removed to an isolated shed; should be attended to by some one who has nothing whatever to do with the other cows; should have her skin carefully cleansed, and if necessary washed with a disinfectant, and her teats and udder also washed with carbolic acid or other disinfecting agent.

3. The cowshed, after her recovery, should be thoroughly cleansed and disinfected, and the cow should not be again placed in the milk business until her health is completely restored.

4. That the history of the outbreak points to urgent necessity for the systematic and careful inspection of all farms supplying the public with milk, by men thoroughly conversant with cow diseases, and having special knowledge of such as may possibly be transmitted with milk to human beings. There is room for great improvement in the knowledge of cow diseases among farmers and cowkeepers, and it is to be hoped that government will see fit before long to institute some means of more effectually protecting the general public against recurrence of those disastrous outbreaks of disease which are due to milk.

LEAD POISONING.

REICHARDT, of Jena (*Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege*, Bd. 17, No. 4, S. 565), criticises the conclusions of Hamon and others, that drinking water should not be conveyed in lead pipes. His own experience, dating from 1879, showed that under certain circumstances lead pipes are not prejudicial to water. He examined a number of lead pipes which had been in use for three hundred years, and found that the inside of each was coated with phosphate and chloride of lead, with a small admixture of oxide of lead; that chalk and magnesia were present in very small quantities; and that the pipes appeared to be in good condition. A series of experiments were conducted with distilled water, spring water, and acid water, some of which remained several weeks in the pipes, each pipe containing one litre of water. The distilled water, as well as the acid water, gave, after even a few days, lead reaction, but the spring water remained in the pipe for weeks without showing any traces of lead. In these experiments the pipes were completely filled with water in order to hinder any action of the air, for on all occasions when the opportunity occurred for the lead to become oxidized, it dissolved in the water. Reichardt's conclusions, both in 1879, and after comparison with the analyses made by experimenters in France and Germany, may be summed up as follows: lead pipes are perfectly innocuous for ordinary drinking water when used as closed pipes, or where there is high pressure, but it should be made contrary to law to employ lead for cisterns or open pipes to convey drinking water.

DR. SINCLAIR WHITE ("Report on the Action of Sheffield Water on the Lead Communication Pipes, 1886") gives an interesting account of the pollution with lead of the water-supply to a part of Sheffield, England. The town derives its supply from two sources; both supplies are from peaty land, containing also iron pyrites, but the water of one is distinctly acid, and it was thought that this might have arisen from the action of soft water on the pyrites; and secondly, from ulmic and humic acids, which would result from decomposing vegetable substances. The second supply is not acid, and the

area whence it is received contains less peat and much less pyrites. Lead was found in the first only, and that supplied by new lead pipes contained from 0.14 to 0.61 grain per gallon, whereas that supplied by old lead pipes from 0.14 to 0.42 grain per gallon; long pipes caused greater pollution than short ones; the duration of time the water stood in the pipes also had its influence. The effect on water drinkers was very distinct, and led to the investigation, symptoms of lead poisoning appearing only among drinkers of water from the first source. Dr. White recommends the use of limestone for neutralizing the acid of the water.

The Sanitary Record (1886, page 396) states that M. Girard, of the Paris Municipal Laboratory, has sent in a report to the Conseil de Salubrité de la Seine concerning the frequent occurrence of cases of lead poisoning resulting from the use of cisterns which are painted with red lead in order to prevent the metal of the cistern from oxidizing. M. Gautier, Professor of Chemistry, has expressed his concurrence in the opinion that the red lead is responsible for the poisoning, and its use for painting cisterns is to be forbidden.

A bill has recently been introduced into the German Parliament, which has as its object the regulation of the use of lead in the manufacture of utensils used for cooking. No vessel, it is proposed, shall be used which contains more than ten per cent. of lead, solder is not to contain more than the same amount, and no alloy is to be employed for coating iron cooking utensils which contains more than one per cent.

INDUSTRIAL DISEASES.

BRUHAT (*Journal d'Hygiène*, vol. ii., No. 500, p. 191) makes mention of the poisoning of a number of people in an aniline factory at Basle from arseniuretted hydrogen. Aniline is usually prepared with benzine converted into nitrobenzine by nitric acid, and by distilling this nitrobenzine in an atmosphere of hydrogen. In France it is usual to employ for the production of hydrogen iron filings and acetic acid; in other countries, and especially in Switzerland, it is customary to replace the acetic acid by hydrochloric acid on the ground of cheapness. A firm at Basle, some weeks ago, used German hydrochloric acid prepared with sulphuric acid produced from copper pyrites, always containing arsenic. In the course of the manufacture of the aniline, the chloride of arsenic contained in the hydrochloric acid which was used was converted into arseniuretted hydrogen, which nearly destroyed the lives of five workpeople.

The *Journal d'Hygiène* (vol. ii., No. 492, p. 96) calls attention to a recent article in the *Asclepiad* by Dr. B. W. RICHARDSON, who mentions that the healthy skin of workpeople, such as chemists, electricians, and autotype artists, bear perfectly the contact of a concentrated solution of bichromate of potash, thanks to the soundness of the epidermis, but that serious accidents follow when there is any breach of the surface, and notes that Dr. Richardson does not indicate a remedy. It observes that workpeople in Paris engaged in making air-balloons and green shades, and who come in contact with the arsenical green of Schweinfurt, suffer from ulceration of the skin on the genitals and other parts of the body, which resemble syphilitic ulcerations, and that Dr. de Piétra Santa successfully uses lotions of salt water and applications of calomel in a state of vapor, producing corrosive sublimate in a nascent state.

F. SCHÜLER (*Deutsche Vierteljahrsschrift f. öff. Gesundheitspfl.*, Bd. 17, No. 2, S. 274) reports on several cases of lead poisoning amongst Jacquard weavers which appeared toward the end of 1883 and the beginning of 1884 in Stäfa on the Lake of Zurich, Switzerland. The cases occurred in those workshops where many workpeople were crowded together, and where there was but little thought of ventilation and cleanliness. The probable cause of the disease was the dust from the leaden weights which are used by the weavers. These weights are attached to the threads of the warp, and as one thread after another is raised, the weight attached to it is rubbed against those belonging to the others. At first this is unimportant, especially if the lead is smooth and covered with varnish; the latter, however, soon wears off, and if the loom is placed on an uneven floor, or if the leaden weights get out of place, so that they rub against each other more often, then a thin layer of dust by degrees covers the floor under the loom, and this dust contains minute particles of lead. In some instances as much as 56.86 per cent. of the dust was lead, and even where the utmost care is taken nine or ten per cent. of lead is found in the dust on the floor and furniture of the room. Much may be done in keeping the workplaces clean, and building well-ventilated, substantial rooms where there can be no overcrowding; but the only remedy is to abolish the use of leaden weights, and to supply their place with some innocuous material. Glass has been tried as a substitute, but it was found to be useless on account of its brittleness; iron is, however, most often used where lead is condemned, the chief objection being the cost of the iron, but this could be materially lessened if the demand were greater; and this would result if it were made compulsory to replace all lead weights by iron within a certain time, such as two or three years.

The Société de Médecine et de Pharmacie, in the province of Haute Vienne, have recently been discussing questions relating to the health of workpeople and artists employed in the manufacture of Limoges china. M. RAYMONDAUD states that, from his personal experience, the position workers on china are forced to occupy is a cause of spinal curvature, and of thirty-seven such persons observed by him half were in this condition, of whom eight had the right shoulder higher, and six the left shoulder higher than the other. Dr. BOUDET had investigated the conditions under which the work is carried on, and he found that in the early operations of crushing and grinding the quartz, the workpeople are exposed to dust which is dangerous to the lungs. Again, in the preparation of the paste they work on a paved floor over which the water flows continuously, and thus they contract maladies which have direct relation with dampness. Those who are employed to place in the ovens the paste prepared in the factories are exposed to the dangers of an escape of sulphuric acid gas, while those who are occupied in turning, polishing, and dusting the china, suffer from the action of the dust on their bronchial tubes (*Journal d'Hygiène*, vol. ii., No. 492, p. 96).

PRECAUTIONS AGAINST INFECTIOUS DISEASES IN SCHOOLS.

This subject was recently discussed at Freiburg, at the annual meeting of the Verein öf. ff. Gesundheitspflege, when DR. ANNSPERGER read a paper recommending that:

1. All children suffering from infectious diseases or skin affections are to be excluded from school. It is desirable, in order to attain this object, that the teacher should be acquainted with the characteristic appearance of each of these diseases in order to remove all sick children, or suspicious cases, before even communicating with the school committee. The police should inform all teachers of cases of infectious disease amongst children which come under their knowledge.

2. The exclusion from school must continue until either a medical certificate is obtained declaring the recovery to be complete; or in case of not having a certificate, until after a sufficient time has elapsed since the beginning of the illness—*i. e.*, six weeks for scarlet fever, three weeks for measles, a fortnight for diphtheria, and as long as the paroxysms last in whooping cough.

3. Special precautions should be taken by the sanitary police in cases of diphtheria, scarlet fever, and measles. If one of these diseases occurs in a school-house, either the sick person should be immediately removed, or the medical officer of health should be asked whether it be possible to carry out complete isolation of the sick person, and if neither plan is possible, then the school should be closed. Therefore, it is to be desired that the houses in which the children dwell should be so arranged, with regard to the school-house, that no interruption in the teaching need occur. If the outbreak takes place in the house of a teacher, then the teaching must at once cease and the medical officer of health should determine when the teaching may recommence.

4. In order to prevent the spread of these diseases, it is equally necessary for parents and relations of children to give notice to the teacher of any case of infectious disease occurring in the family or house.

In consequence of the extreme contagiousness of measles, all schools or classes should be closed immediately on the appearance of the first cases, especially as it is shown by experience that schools are the chief centres for the spread of this disease. Children, in whose houses the disease has occurred, should be excluded from school until three weeks after the last case has occurred; with regard to scarlet fever six weeks, and diphtheria a fortnight from the beginning of the last case of illness.

5. The isolation of the sick can be thoroughly carried out in only a few cases, therefore it is only occasionally that healthy children coming from an infected house can attend school; and, at any rate, this cannot take place till ten, or with diphtheria five, days have elapsed since the healthy child came in contact with the sick person.

6. If epidemics of children's diseases should occur, the strictest precautions should be taken to prevent the spread of the disease.

7. Ventilation of the school-rooms, increased outdoor exercise of the children, avoidance of much home work, should be specially considered during epidemic times, but special disinfection of schools beyond cleansing and ventilation is not desirable.

8. It should be forbidden to expose bodies of children who have died of infectious disease and to let children take part in the burial.

INDEX.

ABDOMEN, pendulous, prophylaxis of, in women, 292

Abdomen, treatment of penetrating wounds and visceral injuries of, 235

Abscess, intracranial, trephining for, 551, 571

Acid, oxybutyric, in diabetic urine, 544

Acids, lower fatty, toxic action of, 612

Acids, volatile fatty, conditions affecting presence of, in urine, 545

Albuminometry, 544

Albumoses, physiological action of the, 525

Alcohol, consumption of, in France, 529

Alopecia areata, etiology of, 268

Amblyopia, diagnosis of simulated unilateral, 564

Amyl nitrite, action of, 220

Anæmia, pernicious, etiology and curability of, 531

Antipyrin, 527

Antisepsis in relation to legal responsibility, 611

Antisepsis, ocular, 564

Aorta, abdominal, aneurism of, 229

Appendix, vermiform, perforating inflammation of, 321.

Arsenic, state of corpse after poisoning by, 614

Artery, central retinal, partial embolism of inferior division of, 241

Artery, innominate, compression of the, 228

Artery, left internal carotid, aneurism of, 255

Ascites, treatment of, 236

Asphyxia, value of different methods for resuscitating children born in a state of, 599

Asthma, relation of diseased nasal mucous membrane to, 578

Antiseptics, 552

Atkinson, scarlatinal nephritis, 53

Atrophy, progressive muscular, 534

Attacks, epileptiform, caused by simple chronic non-suppurative otitis media, 576

BACTERIA, action of, in operations on the eye, 248

Bacteriology, Cheyne, 66, 346

Battay, castration in nervous and mental diseases, 483

Bladder, drainage of the, 231

Blake, reflex aural symptoms, 384

Bleb-formation, hereditary predisposition to, 272

Bones, long, treatment of complicated fractures of, 554

Brain, abscess of the, 251

Bramwell, ulcerative endocarditis, 17

Breast, epithelioma of, 557

Breast, osteochondro-sarcoma of, 557

Bronchi, relation between calibre of, and volume of the lungs, 207

Bronchitis, chronic, treatment of, 220

CANAL, auditory, morbid changes in bone in, in ancient Peruvian skulls, 250

Canal, external auditory, membranous closure of, 249

Capsulectomy, 562

Capsulectotome, a new, 562

Cataract caused by naphthalin, 529

Cataract, extraction of, 569

Cavity, nasopharyngeal, adenoid vegetations in, 260

Cavity, tympanic, treatment of suppuration of, 571

Cervix uteri, indications for site of operation in cancer of, 604

Cheese, poisoning by, 303

Cheyne, bacteriology, 66, 346

Children, apparently stillborn, value of Schultze's swinging movements for resuscitating, 599

Chorda tympani, relation of, to perception of taste in anterior two thirds of the tongue, 251

Chyluria, 542

Cirrhosis, hypertrophic, treatment of, 218

Cocaine, physiological and pathological action of, 562

Cocaine, toxic symptoms from, 555

Cochlea, necrotic, exfoliation of a, 253

Colchicine, alleged poisoning by, 304

Commissure, posterior cerebral, function of, 210

Contractions, uterine, not induced by hydrastis canadensis, 593

Convergence, insufficiency of the power of, 243

Cord, spinal, constitution of lateral column of, 209

Cord, spinal, irritability of, 210

Cord, umbilical, prolapse of, through rectum, 594

Cord, umbilical, when to tie, 289

Cornea, artificial, 239

Cornu laryngeum, 262

Corpses, different putrefactive appearances in two, 301

Coryza, 258

Cross, abnormal visual sensations, 415

Croup, diphtheritic, treatment of, 235

Croup, pseudo-membranous, 409

Cysticerci, intraocular, extraction of, 568

Cysts, sebaceous, removal of, 555

DACROCYSTITIS, antiseptic action of cocaine, corrosive sublimate, and chlorine water upon the secretions in, 247

Dalby, functions of membrana tympani, 121

Delhi boil, 271

Dermatitis ferox, 267

Diabetes, relations of, to uterine life, menstruation, and pregnancy, 295

Diphtheria, treatment of, 577

Disease, Basedow's, operative therapeutics of, 532
 Disease, hip, rectal exploration in, 228
 Disease, intranasal, and exophthalmic goitre, 580
 Disease, malignant, laryngectomy for, 555
 Diseases, industrial, 618
 Disease, infectious, precautions against, in schools, 619
 Diseases, nervous and mental, castration in, 455
 Diseases, venereal, cocaine in treatment of, 529
 Dislocations, hip, treatment of, 229
 Donaldson, function of recurrent laryngeal nerve, 93
 Douche, the nasal, 578

EAR, foreign bodies in the, 249
 Ear, middle, acute and chronic purulent inflammations of, 569
 Ear, middle, radical cure of chronic purulent inflammation of, 570
 Eczema, treatment of, in children, 272
 Elephantiasis arabum of labia majora, 166
 Empyema, surgical treatment of, 227
 Endocarditis, ulcerative, 17
 Endometritis corporis, 601
 Epilepsy, 242
 Epistaxis, 258
 Erysipelas, antiseptic treatment of, 553
 Excavation, glaucomatous, doctrine of, 563
 Exophthalmos, remarkable case of, 563
 Eye, changes in fundus of, in sepsis, 242
 Eye, paralysis of motor nerves of, 246

FEEDING, infant, 600
 Fever, hay, 259, 580
 Fever, typhoid, treatment of, 527, 528
 Fever, yellow, 395
 Finger, little, short muscles of, 521
 Finlay, yellow fever, 395
 Fitz, perforating inflammation of vermiform appendix, 321
 Flat-foot, 230
 Fœtus, habitual death of, in utero, due to renal disease in mother, 592
 Fœtus, intrauterine, cardiac impulse of, 276
 Foot, spontaneous phlebectasia of, 237
 Fractures and dislocations, 554

GELOSIN, 530
 Germs, infecting, in lachrymal sac abscesses, 246
 Germs, pathogenous, fate of, in the body, 227
 Gestation, extrauterine, 283
 Gland, mammary, temperature of, during the puerperium, 291
 Gland, septal, rudiment of, in the human nose, 206
 Gland, thyroid, anatomy of, 208
 Glaucoma, etiology of, 240
 Glosso-pathology, papayotin in, 270
 Gonorrhœa, significance and diagnosis of, in women, 297
 Grafting, ocular, 246
 Grindelia robusta, physiological and clinical action of, 220

Groin, extirpation of tumors of, 556
 Growths, malignant, new treatment of, 556

HÆMOMETER, a new, 545
 Harvey, chronic hyperplasia of oral mucosa, 110
 Head, after-coming, application of forceps to, 595
 Head, injury to, 615
 Heart, diseases of, resulting from over-exertion, 536
 Heart, injury of, 608
 Hegar, castration in nervous and mental diseases, 471
 Hemiplegia, diabetic, 532
 Hernia, new method of reducing, 230
 Highmore, abscess in antrum of, 557
 Hutchinson, clinical groups of tumors, 103
 Hydroa, 586
 Hydrogen, sulphuretted, 302
 Hydrophobia, cocaine to pharynx in, 255
 Hypnotism, parturition during, 274

IMPETIGO, treatment of, in children, 272
 Infanticide, alleged, 610
 Infanticide, lung test in, 300
 Infectious milk, 615
 Inflammation, sympathetic, 240
 Insanity and crime, 373
 Ischuria, etiology of, 289

KERATITIS, sympathetic, 239
 Kinkead, insanity and crime, 373
 Knee-joint, fatty and sarcomatous tumors of, 561

LABIA majora, elephantiasis arabum of, 166
 Labor, induced premature, combined version in, 285
 Lanolin, 266, 589
 Laryngectomy, 585
 Laryngitis, aluminium acetico-tartaricum and aluminium acetico-glycerinatum siccum in, 258
 Laryngitis, pseudo-membranous, treatment of, 234
 Larynx, carcinoma of, 263
 Larynx, echondroses and exostoses of, 262
 Larynx, fracture of, 262
 Larynx, intubation of, 560
 Larynx, neuroses of, 264
 Larynx, spasm of, and epilepsy, 582
 Larynx, spasm of, in hydrophobic tetanus, 264
 Larynx, paralysis of, 265
 Larynx, treatment of tuberculous ulcerations of, 581
 Larynx, tuberculosis of, 261, 581
 Larynx, tuberculous tumors of, 581
 Leucoderma syphiliticum, 568
 Lewis, tendon-jerk and muscle-jerk in disease, 363
 Lichen planus, 587
 Lip, cancer of, results of operation for, 555
 Lipoma, subconjunctival, 568
 Literature, recent surgical, 222, 545
 Lungs, relation between volume of, and calibre of the bronchi, 207
 Lupus vulgaris, relation of, to tuberculosis, 587

MALLEUS, fracture of handle of, 250
 Mason, traumatic neuritis, 131
 Mastitis, puerperal, etiology of, 597
 Mastoid, operations on the, 574
 Meatus, external auditory, skin of, 522
 Membrana tympani, functions of, 121
 Membrana tympanorum, rupture of both, 252
 Membrane, pituitary, adenoid tissue of, 522
 Micrococcus Pasteuri, 123
 Microorganisms, occurrence of, in conjunctival sac, 567
 Milk, elimination of various substances through the, 598
 Milk, therapeutical applications of, 525
 Mitchell, tendon-jerk and muscle-jerk in disease, 363
 Molluscum contagiosum, 588
 Mouth, tuberculous ulceration of, 253
 Murder or suicide, 609
 Muscle-curve, uterine, form of, 276
 Myositis, acute, 229

NÆVI, orbital, treatment of, 587
 Neck, scrofulous, treatment of, 552
 Nephritis, scarlatinal, 53
 Nerve, auditory, central connections of, 521
 Nerve, external nasal, therapeutic value of laceration of, 569
 Nerve, fifth, origin of ascending root of, 209
 Nerve, recurrent laryngeal, function of, 93
 Nerve-stretching, 245
 Nerve-suturing, 227
 Nerve, sympathetic, development of, 214
 Nerves, vasomotor, 211
 Nerves, visceral, 211
 Neuritis, acute rheumatic retrobulbar, 243
 Neuritis, multiple, pathology of, and alcohol paralysis, 533
 Neuritis, peripheral, in phthisis, 534
 Neuritis, relapsing, 565
 Neuritis, traumatic, 131
 Neuroses, laryngeal, of central origin, 582

OBSTRUCTION, intestinal, due to gall-stones, 553
 Œsophagotomy, 257
 Œsophagus, carcinoma of, 257
 Œsophagus, resection of a cancerous, 554
 Œsophagus, stricture of, 257
 Operation, Alexander's, 559
 Operation, Porro's, 288
 Oral mucosa, chronic hyperplasia of, 110
 Organs, genito-urinary, tubercular disease of, in the male, 232
 Organs, pelvic, palpation of, 298
 Organs, pelvic, position of, in the female, 522
 Oxytocic, quinine as an, 275
 Ozæna, treatment of, 258

PALATE, soft, cylindroma of, 254
 Palate, soft, unusual wound of, 254
 Pancreas, cyst of the, 556
 Pancreas, surgery of the, 141, 423

Paralysis, alcohol, pathology of multiple neuritis and, 533
 Paralyzes, laryngeal, 584
 Patella, fracture of, 548, 549
 Pelvis, dermoid cysts of, 601
 Peptones, physiological action of the, 525
 Perineum, ruptured, continuous catgut suture in, 599
 Peritonitis, perforative, diagnosis and therapy of, 541
 Peritonitis, suppurative, laparotomy for, 559
 Peritonitis, treatment of, 233
 Pharynx, pemphigus of, 255
 Pharynx, neuroses of the, 256
 Pharyngitis, treatment of, 258
 Piliganine, 530
 Placenta, adenoma of, 592
 Pneumonia, streptococcus in, after typhoid fever, 535
 Poisoning, chloroform, alleged homicide by, 303
 Poisoning, coal-gas, 612
 Poisoning, lead, 617
 Poisons, drastic, effects of, on intestinal tract, 613
 Polypi, nasal, 259
 Pork, results of recent investigations of, 304
 Potassium, chlorate of, cause of toxic action of, 613
 Pregnancy, albuminuria in, 282
 Pregnancy, dropsy in, 282
 Pregnancy, extrauterine, 284
 Pregnancy, vomiting of, treatment of, 282
 Preparations, ferruginous, hypodermatic employment of, 528
 Presentations, face, etiology of, 593
 Prostate, hypertrophy of, 231, 550
 Ptomaines, 302
 Ptosis, congenital, operation for, 238
 Ptosis, paralytic, operation for, 238
 Pupil, state of, after death, 301

QUEBRACHO blanco, active principles of, 214

RADIUS, dislocation of, 554
 Raymond, elephantiasis arabum of labia majora, 166
 Reflexes, nasal, 260
 Retina, hyperæsthesia of, 566
 Reviews—
 American Surgical Society's Transactions, 169
 Ashhurst, International Encyclopedia of Surgery, 491
 Assaky, Suture of Nerves after Loss of Substance, 196
 Bennett, Case of Cerebral Tumor, 169
 Chiari, Topographical Relations of the Genitals of a Primipara who Died during Labor, 506
 Delafield, Studies in Pathological Anatomy, 515
 Denison, Moisture and Dryness, 192
 Flint, Medicine of the Future, 495
 Freyer, Modern Treatment of Stone in the Bladder by Litholapaxy, 504

Reviews—

- Gottstein, Diseases of the Larynx, 177
 Granger, How to Care for the Insane, 513
 Hamilton, Principles and Practice of Surgery, 197
 Handbook for the Instruction of Attendants on the Insane, 513
 Health Reports—
 Illinois, 202
 Wisconsin, 203
 Ypsilanti Sanitary Convention, 202
 Heath, Dictionary of Practical Surgery, 498
 James, Laryngoscopy and Rhinoscopy, 175
 James, Therapeutics of the Respiratory Passages, 173
 Kurloff, Hyperalimentation in Phthisis, 500
 Lacerda, Hip Pestilence, 512
 Landmarks of Snake Poison Literature, 201
 Landis, Management of Labor, and of the Lying-in Period, 183
 Landois, Manual of Human Physiology, 194
 May, Manual of Diseases of Women, 195
 Moure, Manual of the Diseases of the Nasal Fosse, and of the Nasopharyngeal Cavity, 203
 Otis, Practical Clinical Lessons on Syphilis and the Genito-Urinary Diseases, 507
 Owen, Surgical Diseases of Children, 185
 Parker, Pathology and Etiology of Congenital Club-foot, 191
 Peiper, Hyperalimentation in Phthisis, 500
 Purdy, Bright's Disease, and Allied Affections of the Kidneys, 516
 Roberts, Field and Limitation of the Operative Surgery of the Human Brain, 169
 Ross, Diseases of the Nervous System, 180
 Sayre, Lectures on Orthopædic Surgery, and Joint Diseases, 520
 Starr, Diseases of the Digestive Organs in Infancy and Childhood, 509
 Von Arlt, Clinical Studies on Diseases of the Eye, 204
 Von Ziemssen, Handbook of General Therapeutics, 199
 Waring, How to Drain a House, 188
 Waring, Manual of Practical Therapeutics, 520
 Rheumatism and acute tonsillitis, 255
 Rhinitis, chronic, treatment of, 258
 Rhinoscleroma, 269
 Rotch, reflex aur symptoms, 384

SALOL, 530

- Salts, mercurial, changes which the different, undergo in the organism, 611
 Section, Cæsarean, 286, 288
 Section, Cæsarean, improvements in performance of, 596
 Senn, surgery of the pancreas, 141, 423
 Sensations, abnormal visual, 415
 Septum, nasal, neoplasms of, 261
 Shock, 293
 Skiascopy, 248
 Smith, pseudo-membranous croup, 409
 Solution, Fehling's, improvement in use of, 543

- Speculum, new nasal, 257
 Spine, lumbar curve of, 205
 Staphyloma, corneal, modified sclerotomy in, 563
 Sternberg, micrococcus Pasteuri, 123
 Sterno-mastoid, hæmatoma of, in newborn children, 292
 Stomach, affections of, tinnitus aurium in, 576
 Stomach, diagnosis and therapeutics of diseases of, 539
 Stomach, operations on the, 232
 Symptoms, reflex aural, 384

TARSUS, morphology of the, 205

- Tendon-jerk and muscle-jerk in disease, 363
 Tension, intraocular, experimental investigation of, 561
 Tetanus, 558
 Thallin, results of administration of, 221
 Throat, mycosis of, 255
 Thumb, short muscles of, 521
 Tonsil, accessory, 255
 Tonsillitis, acute, and rheumatism, 255
 Trachea, stricture of, 265
 Tracheotomy, feeding by stomach-tube after, 585
 Trachoma, treatment of, 565
 Trichiasis, modern operations for, 244
 Tulipiferine, hydrochlorate of, 524
 Tumors, clinical groups of, 102
 Tumors, malignant, lateral laryngotomy for extirpation of, 256.
 Twins, anomalous case of, 591

ULCER, gastric, treatment of, 541

- Urethan, physiological actions of, 219
 Urethra, splitting of whole, during labor, 285
 Urine, normal, quantitative determination of reducing substances in, 543
 Urine, prostatic retention of, early treatment of, 550
 Uterus bicornis, pregnancy in one horn of, 591
 Uterus, cavernous myofibromata of, castration in, 603
 Uterus, extirpation of entire, 607
 Uterus, human, peristalsis of, 275
 Uterus, lower segment of, 273
 Uterus, palpation of, per vaginam, 590
 Uterus, rupture of, 286
 Uterus, supravaginal amputation of, 558

VAGINA, injuries of, and perineum, accompanying labor, 593

- Vein, umbilical, condition of, after birth, 206
 Vulva, pre-fœtal dilatation of, 276

WARTS, acuminated, resorcin in, 268

- Wells, castration in nervous and mental diseases, 455
 Winslow, hernia into foramen of, 551

XANTHOPSIA, 566



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